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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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75-0503. Arasa, F. (Author address not given). **La ecologia vista por el medico humanista. Primera parte. [The ecology as seen by the humanist physician. Part 1.]** *Folia Clin. Int. (Barcelona) 24(3): 198-222; 1974.* (Spanish)

General problems of the ecology and environmental protection are discussed. The ever-increasing degree of contamination of the environment due to air, water, and soil pollution and residues of pesticides and other toxic substances calls for a humanistic medical approach to protection of the primary human and humane interests in a technology- and profit-oriented society. In general, the principal mechanisms of action of toxic substances may be exerted via their influence on enzymes and enzyme systems, direct chemical combination with cell components, or secondary effects of the presence of the toxic substance in the organism. Certain pesticides, such as DDT, while presenting environmental hazards due to their persistence and accumulation in the trophic chains, have considerable merit in the control of diseases, such as typhus and malaria.

75-0504. Gehring, P. J.; Rowe, V. K.; McCollister, S. B. (Chem. Biol. Res., Dow Chem. Co., Midland, MI 48640). **Toxicology: cost/time.** *Food Cosmet. Toxicol. 11:1097-1110; 1973.* (26 references)

In the early 1950's toxicology requirements for pesticide registration were limited to data from single-dose oral administration and from a subacute study in which material was fed to rats for a period of 30-90 days, with monitoring of a few toxicity indicators. Even at today's prices that would cost less than $10,000. However, increased sensitivity of methods for detecting pesticide residues and monitoring signs of toxicity plus increased concern for the impact of pesticides on the environment have added new requirements to the testing procedure. Acute studies are now required not only on the chemical itself, but also on the formulated product and on major metabolites; these tests include oral LD50, dermal LD50, inhalation LD50, eye irritation, skin irritation, avian oral LD50, fish LC50, and crustacean LC50. Total cost for these studies would average $18,405 and would require 18 weeks. Subacute toxicity studies, intended to evaluate the effects of relatively short-term repeated exposures to pesticides, range in cost from $88,690 -$112,290 and require at least 13 months. Metabolism studies are conducted to uncover the means by which the animal deals with the chemical and average $14,733 over a 3-12 month period. Metabolism studies may also be carried out in man, for $21,080 over 1-3 months. To determine a threshold level which, if exceeded, will alter a sensitive biochemical activity, may cost $50,000 and take 1 yr to complete. Reproduction and fetal development studies average $35,410 and require 2 or more years. Separate teratogenic potential studies cost $10,420 and cover 4 months to 1 yr, depending on species involved. Long-term toxicity studies, primarily for carcinogenic potential, run for 18 months to 2 yr. The total cost of the toxicological evaluation of a pesticide would range from $306,800 to $375,480 at a minimum and take at least 4 yr to complete. Addition of various other studies could easily run the cost to $750,000. It is urged that duplication now necessary under the legal requirements be done away with so that the expense and time involved will not endanger the food supply of the nation and the world.

75-0505. Oser, B. L. (Food and Drug Res. Lab., Inc., New York, NY). **An assessment of the Delaney clause after 15 years.** *Food Cosmet. Toxicol. 11:1121-1126; 1973.*

The basic fault of the Delaney clause is the assumption that ingestion of any substance by animals, irrespective of the magnitude, frequency, or duration of dosage, is an appropriate method for determining the carcinogenic potential of that substance in man. Highly exaggerated dose levels and varied routes of administration are appropriate to a study of the mechanism or etiology of the cancer process, as they shorten the time in which the cancer develops and increase the incidence of the neoplasms. However, such exaggerations are not acceptable in determining the safety of trace substances in the human diet. Another problem arising from the wording of the Delaney clause has come about with improvements in analytical equipment. Substances which had been given a zero tolerance level and had not previously been detectable in foods are now being detected. It is suggested that the Delaney clause be amended to permit the exercise of scientific judgment in determining the appropriateness of safety evaluation procedures.

75-0506. Rosival, L.; Sokolai, A.; Batora, V. (Sci. Res. Inst. Hyg., Bratislava, Czechoslovakia). **Rezul'taty gigiyenicheskogo i toksikologicheskogo izucheniya pestitsidov v stranakh SEV za 1962-1972 gody. [Results of hygienic and toxicologic studies of pesticides in the Comecon member countries in the 1962-1972 period.]** *Gig. Sanit. 39(5): 73-76; 1974.* (Russian)

The results of hygienic and toxicological studies of pesticides performed by different institutions in Czechoslovakia, USSR, Hungary, East Germany, Poland, Bulgaria, and Yugoslavia in 1962-1972 are surveyed. The concerted activity of the member countries of Comecon was oriented toward reducing the hazards involved in environmental contamination by pesticides, standardizing pesticide residues in various media on the basis of their toxicity and residue dynamics, and standardizing pesticide residue analytical methods. Standard analytical methods were developed for residue analysis, especially on the basis of the multidetector chromatographic method. Standard methods have been recommended for disulfoton, thiomethon, tetrathionyl sulfoxide, DDT, thiometon sulfoxide, fenitrothion, dimethoate,

hexaphen, methoxychlor, zineb, and cyanogen-methyl bromide. The pesticide residue dynamics during industrial and culinary food preparation are studied. Steps are being taken in many countries to replace DDT and similar organochlorine pesticides by less persistent compounds.

75-0507. Saunders, A. K.; Parker, A. E.; Smathers, J. B. (Author address not given). **Report of the Committee on Dairy Farm Methods, 1972-1973.** *J. Milk Food Technol. 37(6): 333-334; 1974.*

The adulteration of milk supplies by antibiotics, pesticides, sanitizers, detergents, water, and microorganisms is discussed. Pesticides continue to be a problem in certain areas of the United States, but there are indications that controls placed on their use and time of application have decreased the incidence of pesticide residues in milk supplies. Surveillance programs continue to play an important part in eliminating the adulteration of milk supplies by pesticides. PCBs have been in the environment for many years, and it will take considerable effort to eliminate them. It is recommended that education programs concerning the use of pesticides be continued and strengthened; that directions on all pesticide labels be plain, simple, and distinct; that commercial applicators be licensed and controlled; and that chlorinated hydrocarbon pesticides as well as PCBs be excluded from use where residues cannot be controlled.

75-0508. Matthey, E. (Div. Food Control, Federal Service of Public Hygiene, Switzerland). **Die Durchfuehrung der Lebensmittelkontrolle in der Schweiz im Jahre 1973. Bericht des Eidgenoessischen Gesundheitsamtes Abteilung Lebensmittelkontrolle. [Food testing in Switerland in 1973. I. Report of the Food Testing Department of the Federal Bureau of Public Health.]** *Mitt. Geb. Lebensmittelunters. Hyg. 65(3): 249-268, 1974.* (German)

The activities of the Swiss Federal Bureau of Public Health in food testing in 1973 are surveyed. Maximum allowable residue levels have been elaborated and recommended for standardization of newly registered pesticide preparations. The toxicological aspects of the use of pesticides and wood preservatives in premises where food is stored, processed, and dispensed were investigated. New analytical methods have been developed for residue analysis in foodstuffs. Exhaustive studies were conducted on the degree of the pesticide burden of the population. Studies of hexachlorobenzene residue dynamics in soil and plant materials in areas where this pesticide had been used revealed very slow abatement of the residue levels.

75-0509. Stevenson, D. E. (Tunstall Lab., Sittingbourne, Kent, England). **Chemicals and cancer.** *Nature (London) 252(5481): 267; 1974.*

Issues raised in the aldrin and dieldrin suspension hearing are clarified in a letter-to-the-editor. The five criteria listed for providing evidence of human carcinogenicity appeared in the Administrator's Opinion, and were not taken from any statement by the author. The fact that dieldrin would be taken off the market if human cancer cases occurred does not imply that human cancer cases must occur before a product is removed from the market. Advice to remove a product from the market would be given at an earlier stage if the situation warranted such a move.

75-0510. Kenez, J. (Author address not given). **Hullamhegy es hullamvology a DDT megiteleseban. [Pros and cons in the evaluation of DDT.]** *Orv. Hetil. 115: 1177-1181; 1974.* (Hungarian)

Controversies surrounding the hygienic and toxicological evaluation of DDT are reviewed on the basis of research conducted during the past ten years since the publication of Rachel Carson's Silent Spring. When applied in the prescribed manner, DDT has no toxic effect on humans, while careless use, and especially aerial application, may lead to massive deaths of fish and birds. DDT is of enormous importance in the protection of crops and in the prevention of epidemics, especially in tropical regions. The storage of DDT residues in fatty tissues was found to be reversible, decreasing with time. No change in the cancer morbidity pattern of human populations contaminated by DDT was evidenced. While DDT was found to be carcinogenic in mice, no carcinogenic effect has ever been discovered in humans. Results of animal experiments regarding carcinogenic action cannot be extrapolated directly to humans.

75-0511. Anonymous. **Pestizid-Boom und Umwelt-Belastung. [Pesticide boom and environmental pollution.]** *Umschau Wiss. Tech. 74(18): 576-579; 1974.* (German)

The benefits and ecological hazards of pesticides use are discussed. While pesticides, of which herbicides and fungicides are used in the largest amounts, are indispensable, they may exert direct and indirect effects on the ecosystem and particularly on human health. The long-term indirect effects of herbicides may be present as disturbances in the natural equilibrium and as changes in the natural flora and fauna. While most herbicides are rapidly degraded in soil, residues of triazines and urea derivatives may persist for over one year. Dinoseb and DNOC inhibit nitrifying bacteria and are toxic to warm-blooded animals, fish, and bees. Most organic fungicides are rapidly inactivated and degraded in the soil. Organophosphorus insecticides are beneficial environmentally, as they are not persistent and do not accumulate in the ecosystem. New, alternate methods of pest control, e.g., the use of attractants and possibly of bacteria and viruses, should be studied.

75-0512. Ilyaletdinov, A. N. (Author address not given). **Primeneniye dostizheniy mikrobiologii v dele okhrany prirody i ratsional'nogo ispol'zovaniya prirodnykh resursov. [Application of achievements in microbiology to environmental protection and the utilization of natural resources.]** *Vestn. Akad. Nauk Kazakh. SSR 8: 11-14; 1974.* (Russian)

The application of the latest achievements in microbiology to environmental protection and industrial processes is discussed. New pesticides and other preparations must be degradable by microbiological and chemical factors in the soil and thereby become incorporated in the material cycle of the biosphere. The lack of research on herbicides in Kazakhstan despite extensive use of such preparations is criticized.

75-0513. Szarvas, E. (Author address not given). **Oekologiai feladatok a hidroszfera vedelmben. [Ecological tasks in the protection of the hydrosphere.]** *Vizgazdalkodas 14(3): 31-36; 1974.* (6 references) (Hungarian)

General ecological tasks and problems emerging in the protection of the hydrosphere are discussed. An environmental model describing the relationships between man and the hydrological cycle of the earth are discussed in the light of factors influencing this cycle and possibly causing unfavorable changes. Changes in the hydrosphere beyond a certain limit may be hazardous to man. The spread of toxic and other contaminating substances over the hydrosphere is practically uncontrollable; thus there is a need to prevent such discharges rather than compensate for them. The ubiquitous nature of DDT is demonstrated by its presence in arctic organisms, in the human body in general, and in mother's milk as well as in the newborn infant.

75-0514. Goeden, R. D.; Andres, L. A.; Freeman, T. E.; Harris, P.; Pienkowski, R. L.; Walker, C. R. (Div. Biol. Contr., Univ. California, Riverside, CA 92502). **Present status of projects on the biological control of weeds with insects and plant pathogens in the United States and Canada.** *Weed Sci. 22(5): 490-495; 1974.* (43 references)

Weed species or genera previously and currently targeted for biological control with phytophagous insects or phytopathogens in the United States (including Hawaii) and Canada are listed. The current status of and natural enemies involved in national, federal, state, and university biological control projects are reported. Table 1 reviews the status of biological weed control projects involving the use of phytophagous insects and plant pathogens in the United States, including Hawaii, and Canada through 1973. Much of these data were derived from unpublished sources, but status reports and key references for longer-standing projects also were included to allow as complete an accounting of the present status of this aspect of Weed Science as possible. All biological control agents listed by species in Table 1 are phytophagous insects, indicative of their preponderant use in biological weed control to date. Phytopathogens have only recently received serious consideration as biological weed control agents in North America. Their application in weed control to date has been largely unplanned and fortuitous or experimental and limited in scope (Author abstract by permission)

75-0515. Sobotka-Wierzbowicz, J. (Inst. Galenical Drugs, Coll. Pharm., Warsaw, Poland). **Badania pozostalosci pestycydow z grupy weglowodorow chlorowanych w owocach kopru wloskiego – *Fructus foeniculi*. [Determination of residual pesticides from the group of chlorinated hydrocarbons in *Fructus foeniculi*.]** *Acta Pol. Pharm. 31(3): 345-349; 1974.* (6 references) (Polish)

Six samples of *Fructus foeniculi* harvested at different times were examined for organochlorine pesticide residues by gas chromatography, using petroleum ether for extraction, florisil column clean-up, and a diatomite CQ column with recombination detector for analysis. BHC, DDT, and DDT-derived compounds were found in the samples. The BHC, DDE, DDD (TDE), and DDT residue levels were in the respective ranges of 0.056-0.170 mg/kg, 0.022-0.075 mg/kg, 0.105-0.122 mg/kg, and 0.097-2.28 mg/kg. The maximum allowable DDT residue level is set at 1 mg/kg.

75-0516. Kazen, C.; Bloomer, A.; Welch, R.; Oudbier, A.; Price, H. (Mich. Dep. Pub. Health, Bur. Lab., Lansing, MI 48914). **Persistence of pesticides on the hands of some occupationally exposed people.** *Arch. Environ. Health 29(6): 315-318; 1974.* (14 references)

Hexane hand rinsings were analyzed by electron capture and flame photometric gas-liquid chromatography for pesticide residues to determine whether these chemicals persisted on the skin long after exposure. Chlordane and dieldrin have apparently persisted on the hands of a former pest control operator for at least two years. Methoxychlor, captan, and malathion persisted for at least seven days on the hands of a fruit and vegetable grower. Parathion was found on the hands of one man two months after his last known contact with it. Endosulfan, DDD (TDE), Kelthane (dicofol), Dacthal, Trithion (carbophenothion), Imidan (phosmet), and Guthion (azinphosmethyl) may have persisted on the hands of some exposed workers from 1 to 112 days after exposure. (Author abstract by permission)

75-0517. Adamovic, A. M.; Sokic, B. (Inst. Health Protection Serbia, Belgrade, Yugoslavia). **Lower level phenomena of DDT cumulation in female abdominal fatty tissue.** *Arh. Hig. Rada Toksikol. 24: 303-306; 1973.* (10 references)

The level of DDT storage found in the fatty tissue samples of men was significantly higher than that in women. The mean levels of DDT derived compounds were 12.8 and 10.2 ppm, respectively. Upon comparing the excretion of organochlorine insecticides in the milk of breast-feeding mothers with their total daily dietary DDT intake, it was noted that considerably greater quantities of DDT derived compounds were eliminated than were ingested. This disproportion was far greater in mothers of twins than in mothers of a single child. Similar occurrences were not found in the case of other organochlorine insecticides, although it was noted that the levels of stored dieldrin likewise differed according to sex. Obviously, a powerful mobilization of the stored DDT derivatives takes place during lactation due to hormonal factors. The lower DDT storage found in women may also reduce the mean residue values in terms of the general population and must be kept in mind when evaluating the results of epidemiological studies.

75-0518. Kono, S.; Yamashita, M. (Hyogo Prefect. Agr. Exp. Sta., Akashi, Hyogo, Japan). **Decrease of residual amounts of diazinon in cabbages and soil.** *Bouch-Kagaku (Sci. Pest Contr.) 39(4): 119-125; 1974.* (10 references)

After application of diazinon 34 WP on cabbages planted in actual fields and in lysimeters, the residues of diazinon in cabbages and soil were determined, and the effect of soil type on the residual amount was examined. The dilution rates were 500, 1000, and 2000 fold; the applied volume was 0.251/1.5 X 2 m. Following four applications of diazinon diluted 2000 fold the residues in cabbage were 2.010, 0.169 and 0.018 ppm, respectively, 1, 5 and 15 days after the last application. The disappearance of residue in soil differed according to the consistency of soil, being fast in loam and slow in gley clay loam. The average percentages of residue at 5, 15, 35, 66 and 170 days after application relative to the residue one day after application were 51.2, 37.6, 22.6 and 7.2, respectively. A multiple regression curve was obtained with independent variables such as the number of applications, the dose rate (g/10 are) and the number of days after the last application; the residual amount of diazinon on cabbage estimated by this method coincided fairly well with the experimentally determined value (r = 0.8414.)

75-0519. Rhodes, R. C.; Long, J. D. (Biochem. Dept., Exp. Sta., E.I. du Pont de Nemours & Co., Wilmington, DE 19898). **Run-off and mobility studies on benomyl in soils and turf.** *Bull. Environ. Contam. Toxicol. 12(4): 385-393; 1974.* (11 references)

The run-off and leaching characteristics of ^{14}C-labeled benomyl and its two soil metabolites, methyl 2-benzimidazolecarbamate (carbendazim) and 2-aminobenzimidazole (2-AB), were studied in the greenhouse and laboratory using soil and turf plots and soil thin-layer chromatographic plates. The greenhouse studies demonstrated that benomyl and carbendazim are firmly bound to the soil and do not leach or move significantly from the site of application. The small amount of lateral movement observed was predominantly due to soil erosion, and neither benomyl nor carbendazim showed a significant tendency to move downward in the soil. The *Rf* values for benomyl, carbendazim and 2-AB on Keyport silt loam TLC plates were 0.10, 0.05, and 0.12, respectively. These data confirm the relative immobility of benomyl and its metabolites in soil.

75-0520. Harr, J. R.; Gillett, J. W.; Exon, J. H.; Clark, D. E. (Dept. Vet. Med., Oregon State Univ., Corvallis, OR 97331). **A therapeutic regimen for purging dieldrin from adulterated individuals.** *Bull. Environ. Contam. Toxicol. 12(4): 433-441; 1974.* (18 references)

A total of 1013 steers in four Oregon feedlots had been fed a diet containing over 50% cull seed potatoes contaminated with 0.1 to 0.2 ppm dieldrin (on a dry weight basis); the animals contained tissue residues of up to 0.76 ppm (rendered fat). These residues were in excess of federal guidelines (0.03 ppm, rendered fat), but were considered nonpathological and without physiological effect. Application of a therapeutic regimen consisting of an initial injection of testosterone propionate (10 mg) and vitamins A, D, and E and of daily oral doses of phenobarbital (between 5 and 10 mg/1000 lb for the first 20 days only) and activated charcoal in a finishing ration resulted in marked reductions in dieldrin residues within 30 days. The rate of dieldrin loss was increased 6-fold and the residual half-life reduced from a reported 150-250 days to about 25-80 days by this regimen. The effectiveness of the individual components of the regimen or combinations of them was not evaluated, but the rate of charcoal feeding appeared most important.

75-0521. Wassermann, M.; Tomatis, L.; Wassermann, D.; Day, N. E.; Djavaherian, M. (Dept. Occup. Health, Hebrew Univ.-Hadassah Med. Sch., Jerusalem, Israel). **Storage of organochlorine insecticides in adipose tissue of Ugandans.** *Bull. Environ. Contam. Toxicol. 12(4): 501-508; 1974.* (9 references)

Between 1969 and 1970, 75 samples of adipose tissue were collected during autopsy from persons living in the Kampala area of Uganda; none had known occupational exposure to pesticides. The samples were analyzed by gas chromatography for organochlorine insecticide (OCI) residues. In the 0-4-year age group, DDT-derived material averaged 2.3 ppm, DDE constituting 59.6% of the total; in the 5-24-year age group, total DDT averaged 3.84 ppm, DDE constituting 50.2% of the total; in the 24-44-year age group, total DDT averaged 2.9 ppm, DDE constituting 63.2% of the total; and in the 45 and over age group, total DDT averaged 2.4 ppm, DDE constituting 53.6% of the total. Dieldrin and the beta-isomer of BHC (β-BHC) were found at levels below 0.1 ppm in all age groups, and heptachlor epoxide was found at levels below 0.2 ppm. Males generally stored more OCI than females. In comparison with other study populations in Africa, Asia, and South America, the OCI levels stored in the Ugandan samples were low.

75-0522. Clausen, J.; Braestrup, L.; Berg, O. (Inst. Hygiene, Preventive Med., and Environ. Sci., Odense Univ., Copenhagen, Denmark). **The content of polychlorinated hydrocarbons in Arctic mammals.** *Bull. Environ. Contam. Toxicol. 12(5): 529-534; 1974.* (14 references)

Gas chromatography was used to study polychlorinated hydrocarbon (PCHC), aldrin, heptachlor, heptachlor epoxide, lindane, DDE, and PCB residues in 17 fat tissue samples from four species of Arctic seal and fat samples from a polar bear, two polar foxes, and one sheep; all animals were shot in Greenland. "Raw" *p,p'*-DDE and PCB were found in all specimens in substantial amounts. The peak *p,p'*-DDE values were found in the polar bear fat, and the largest amounts of PCB were found in a hooded seal. Aldrin was found in most samples, but only trace amounts of lindane, heptachlor, and its epoxide were found in some samples. The PCHC concentration varied from specimen to specimen in all species. Since these species migrate or consume fish which migrate, they may accumulate PCHC directly or indirectly from areas in which these materials are used.

75-0523. Paschal, E. H.; Roan, C. C.; Morgan, D. P. (Arizona Community Studies Pesticide Project, Dept. Entomol., Univ. Arizona, Tucson, AZ 85721). **Evidence of excretion of chlorinated hydrocarbon pesticides by the human liver.** *Bull. Environ. Contam. Toxicol. 12(5): 547-554; 1974.* (7 references)

Gas-liquid chromatography was used to measure the amount of dieldrin and/or its metabolites in the bile of five hospitalized patients following cholecystectomy. In addition, the bile, gallstone, and adipose tissue of a pest control worker who had been in regular contact with a special long-acting dieldrin formulation for 8 years were analyzed after cholecystectomy. The serum dieldrin concentrations in this worker had been 100-250 ppb over the 5 years prior to surgery. Substantial amounts of dieldrin and DDE and lesser amounts of other common chlorinated hydrocarbons were found in the adipose tissue, bile, and gallstone taken from the pest control worker; all samples also contained a material resembling the aldehyde product of dieldrin. The dieldrin concentrations in the fat and serum were well over 100 times those found in samples from persons not occupationally exposed. Small amounts of pesticide were found in the bile of the control patients. The data suggest that the liver excretes DDT and dieldrin into the bile and indicates the existence of substrate-responsive excretory mechanisms. The ketone product of dieldrin was not found in any sample analyzed.

75-0524. Parkash, S. (Fuel Sci. Div., Alberta Res. Edmonton, Alberta, Canada). **Adsorption of cationic pesticides (diquat and paraquat) from aqueous solution by activated carbon.** *Carbon 12(5): 483-491; 1974.* (17 references)

The adsorption of diquat and paraquat cationic pesticides from aqueous solution was studied on 3 different activated carbons varying in N_2-BET surface area from 660 m^2/g to 1280 m^2/g. Results suggest that the rate limiting step for removal of these pesticides in agitated non-flow systems is one of intraparticle

transport of the solute in the pores and capillaries of the adsorbent. The sorption rates for both adsorbates may be characterized by diffusion coefficients, *D*, calculated in the usual manner, assuming the flux of diffusion to be proportional to the concentration gradient. The resultant values for D vary in approximately inverse proportion with the N_2-BET surface area of an activated carbon for an individual adsorbate. Adsorption capacities of diquat and paraquat from water on active carbon vary from 18 to 36% and from 6 to 14%, respectively, by weight of active carbon, depending on the surface area of the carbon. These are good ratios, especially in the case of diquat, for removing trace quantities of these pesticides, from a practical point of view. Thermodynamic studies indicate that the removal rate of these pesticides by active carbon is an endothermic process. Competitive adsorption studies of diquat and paraquat when present in equimolar mixture, which should indicate the relative affinity of the available surface for each of the 2 adsorbates, suggest that different sites on the active carbon surface probably adsorb these two substances in a different manner.

75-0525. Vollner, L.; Korte, F. (Inst. Oekol. Chem., Ges. Strahlungs- Umweltforsch. mbH, Munich, Germany). **Beitraege zur oekologischen Chemie XCI. Radiolyse von Chlor-Pestiziden. I. Gamma-Bestrahlung von Dieldrin in Wasser. [Contributions to ecological chemistry, part 91. Radiolysis of organochlorine pesticides. I. Gamma-irradiation of dieldrin in water.]** *Chemosphere 3(6): 271-274; 1974.* (13 references) (Ger.)

The destruction of ^{14}C-labeled dieldrin in water by increasing doses of gamma-radiation was studied. The dieldrin concentration in the water amounted to 100 μg/liter. Quantitative destruction of dieldrin at a radiation dose of 7 Mrad was observed. The radiolysis resulted in a great number of metabolites, the number increasing with the increase of the radiation dose. The high radiation dose required for the quantitative degradation of dieldrin precludes economical use of this method in water and wastewater treatment.

75-0526. Vollner, L.; Korte, F. (Inst. Oekol. Chem., Ges. Strahlen- Umweltforsch. mbH, Munich, Germany). **Beitraege zur oekologischen Chemie XCII. Radiolyse von Chlor-Pestiziden. II. Gamma-Bestrahlung in Hexan, Aceton und Aceton/Wasser. [Contributions to environmental chemistry, Part 92. Radiolysis of organochlorine pesticides. II. Gamma-irradiation in hexane, acetone, and acetone-water mixture.]** *Chemosphere 3(6): 275-280; 1974.* (10 references) (German)

The radiolysis of dieldrin, *cis*-chlordane, lindane, aldrin, 2,2′-dichlorobiphenyl, and 2,2′,5,5′-tetrachlorobiphenyl due to gamma-irradiation at 54 Mrad was studied in hexane, acetone, and a 1:1 mixture of acetone with water. The rates of metabolism were determined to be 74% for dieldrin, 70% for *cis*-chlordane and lindane, 66% for aldrin, 50% for 2,2′-dichlorobiphenyl, and 51% for 2,2′,5,5′-tetrachlorobiphenyl. Mass-spectroscopic studies of the reaction products revealed dechlorination as the principal route of metabolism, while bridge formation was also observed in the case of aldrin, resulting in photoaldrin as a metabolite.

75-0527. Knowles, J. A. (Alamo Medical Group, Alamo, CA). **Breast milk: a source of more than nutrition for the neonate.** *Clin. Toxicol. 7(1): 69-82; 1974.* (43 references)

Factors governing the transfer of drugs and other ingested materials from maternal plasma to breast milk include solubility, ionization, concentration, and special transport mechanisms. Because of the high fat content of human breast milk, drugs with high lipid solubility will tend to concentrate in milk; the higher acidity of milk compared to plasma encourages concentration of basic components. Skin disorders and some deaths occurred in children of nursing mothers who had eaten hexachlorobenzene-treated seed wheat in Turkey in 1956. Mercury and lead have also been transmitted in milk at levels adequate to cause intoxication. Total DDT concentrations in human breast milk in the U.S. have been reported to range between 0.02 and 0.2 ppm on a whole-milk basis. An apparent decline in DDT levels in mothers' milk between 1950 and 1965 was reported, although the data were obtained from different geographical areas. Human mothers are apparently in negative DDT balance while lactating, excreting approximately 125% of estimated DDT intake while cows excrete only about 1.5% of their DDT intake. The mean concentration of DDT in cow's milk is less than 0.01 ppm, while lactating women excrete an average of 0.07-0.08 ppm. An adequate margin of safety seems to exist, so that DDT levels do not seem to necessitate stopping breast feeding.

75-0528. Blus, L. J.; Neely, B. S., Jr.; Belisle, A. A.; Prouty, R. M. (U.S. Bureau Sport Fish. Wildl., Patuxent Wildlife Res. Cent., Laurel, MD 20810). **Organochlorine residues in brown pelican eggs: relation to reproductive success.** *Environ. Pollut. 7(2): 81-91; 1974.* (27 references)

Sample eggs taken from each of 93 marked nests in the brown pelican nesting colony in South Carolina were analyzed for organochlorine pesticide residues using electron capture gas chromatography. Nest success was related to the DDE and dieldrin residues in the sample eggs. DDE seemed primarily responsible for nest failure, although the deleterious effects of this pollutant were not satisfactorily separated from those of dieldrin. Maximum DDE residues in an egg from a successful nest were 2.37 μg/g and from an unsuccessful nest were 8.48 μg/g. Maximum residues for dieldrin were 0.54 μg/g and 0.99 μg/g, respectively. Nineteen of the 26 eggs from

unsuccessful nests contained DDE residues in excess of 2.37 μg/g, and 14 contained dieldrin residues exceeding 0.54 μg/g. DDE, DDT, and PCB residues in sample eggs were not significantly related to nest success. Reproductive success in the colony was subnormal during the study (1971 and 1972), but was normal in those nests from which the sample egg contained either 2.5 μg/g or less of DDE or 0.54 μg/g or less of dieldrin.

75-0529. Linko, R. R.; Kaitaranta, J.; Rantamaki, P.; Eronen, L. (Dept. Biochem., Univ. Turku, Turku, Finland). **Occurrence of DDT and PCB compounds in Baltic herring and pike from the Turku archipelago.** *Environ. Pollut. 7(3): 193-207; 1974.* (23 references)

The contamination of Baltic herring and pike from six different areas of the Turku archipelago (the southwestern coast of Finland) with DDT, DDE, TDE, and PCB was studied. Herring muscle contained an average of 0.38 ppm total DDT and 0.31 ppm PCB on a fresh tissue basis; however, the values obtained for individual fish specimens showed large variations, depending primarily on differences in the fat content of the individual. The range of DDT and PCB concentrations in the herring from the Turku archipelago was similar to that found in herring from the Gulf of Bothnia. Pike muscle contained an average of 0.04 ppm total DDT and 0.05 ppm PCBs on a fresh weight basis. There were local differences in the residue concentrations of the samples. The chlorinated hydrocarbons tended to accumulate in the liver and ovaries of the pike and to a lesser degree in the testes and kidneys. Total DDT and PCB concentrations in the ovaries reached 100 ppm and 190 ppm, respectively.

75-0530. Tsipriyan, V. I,; Savina, R. V.; Savitskaya, Ye. I.; Shevchenko, M. A.; Marchenko, P. V.; Taran, P. N.; Kravets, Ye. V. (Kiev Med. Inst., Kiev, USSR). **Toksikologicheskaya kharakteristika produktov razrusheniya fosfororganicheskikh yadokhimikatov. [Toxicological characteristics of degradation products of organophosphorus pesticides.]** *Gig. Sanit. 39(9): 14-17; 1974.* (3 references) (Russian)

The organoleptic and toxicological characteristics of the metaphos (methyl parathion) and dimethoate degradation products obtained by treating aqueous solutions of these pesticides with ozone, chlorine, potassium permanganate, and hydrogen peroxide followed by UV irradiation were studied. Chlorination intensified the odor of the solutions, while all other treatment methods were efficient in reducing the odor of the waters. Tests were carried out on rats given such solutions containing 25 mg metaphos or 155 mg dimethoate per liter, in intact or degraded form, as drinking water. Reduced toxicity was seen in the case of the degradation products of ozonization, chlorination, and hydrogen peroxide treatment with subsequent UV irradiation, as determined from the cholinesterase inhibition and on the basis of histological investigations. The degradation products formed from dimethoate with potassium permanganate proved to be more toxic than dimethoate. Ozonization and treatment with hydrogen peroxide followed by UV irradiation are recommended for the purification of waters contaminated by thiophosphates and dithiophosphates.

75-0531. Pepino, R.; Rinallo, C.; Tucci, R. (Ist. Chim. Organ., Univ. Florence, Florence, Italy). **Ricerche sulla persistenza dell'idrazide maleica in tuberi di patata (*Solanum tuberosum L.*). [Studies on the persistence of maleic hydrazide in potato tubers.]** *Inquinamento 16(9): 25-33; 1974.* (89 references) (Italian)

The persistence of maleic hydrazide in potato tubers was studied. Potato plants were sprayed with solutions containing 2,500, 5,000, 7,500, and 10,000 ppm maleic hydrazide 31 days before harvesting. The maleic hydrazide residues in the tubers treated with 2,500 and 7,500 ppm were in the respective ranges of 23-46.3 ppm and 29-81.3 ppm, averaging 40.6 ppm. The maleic hydrazide residues averaged 100.6 ppm in the pulp and 79 ppm in the skin in certain lots treated with 2,500 ppm. Following treatment with 2,500, 5,000, and 10,000 ppm, the maleic hydrazide residues measured in March of the following year were 27 ppm, 53.8 ppm, and 56.4 ppm, respectively. The corresponding values measured in April were 40.6 ppm, 50.5 ppm, and 51.9 ppm. The findings indicate high rates of retention and high persistence of maleic hydrazide in potato tubers.

75-0532. Chopra, S. L.; Nandra, K. S.; Kumari, S. (Dept. Chem. Biochem., Punjab Agr. Univ., Ludhiana, India). **Persistence of some pesticides in groundnut plant (*Arachis hypogaea* L.).** *J. Res. Punjab Agr. Univ. 10(2): 199-202; 1973.* (13 references)

Genetically pure groundnut seeds were sown in a sandy loam soil in a randomized-block pattern and fertilized. After 15 days, the crop was sprayed with solutions of thiometon (0, 0.15, 0.20, 0.25, 0.30, or 0.40%), BHC (0, 0.10, 0.15, 0.20, 0.25, 0.30, or 0.35%), simazine (0, 0.6, 1.2, 1.8, 2.4, or 3.0 kg/ha), or 2,4-D (0, 0.6, 1.2, 1.8, 2.4, or 3.6 kg/ha). Residue levels on the leaves were determined using samples taken 15, 45, and 75 days after spraying. Thiometon and BHC residues increased with increasing application dose; the residues decreased as a function of time elapsed since spraying. Similar results were found with 2,4-D; none of this compound could be detected after 75 days on the leaves of plants sprayed with 0.6 or 1.2 kg/ha. Relatively high simazine residues were recovered 15 and 75 days after spraying, the observed decrease in residue levels with time being due to metabolism of the pesticide by the plant.

75-0533. Davis, A. C.; Bourke, J. B.; Kuhr, R. J. (Dept. Entomol., New York State Agr. Exp. Sta., Geneva, NY

14456). **Disappearance of Monitor residues from cole crops.** *J. Econ. Entomol. 67(6): 766-768; 1974.* (2 references)

Cabbage, cauliflower, broccoli, and brussels sprouts were treated with 1 and 0.5 lb/acre of Monitor (*O,S*-dimethyl phosphoroamidothioate). Residue analysis yielded disappearance curves which showed that within 7 days the marketable portion of all crops contained residues at or below the tolerance level of 1 ppm. None of the data gave any indication that Monitor residues would pose a safety problem under New York practices. (Author abstract by permission)

75-0534. Anpalov, V. A. (Siberian Sci. Res. Inst. Agr. Chem., Siberian Dept. of V. I. Lenin All-Union Acad. Agr. Sci., Novosibirsk, USSR). **Prodolzhitel'nost' sikhraneniya pochvennykh gerbitsidov v vyschelochennykh chernozemakh TsChO. [Persistence of soil herbicides in leached-out chernozems of the Central Chernozem Belt.]** *Khim. Sel. Khoz. 12(9): 53-55; 1974.* (13 references) (Russian)

The persistence of various soil herbicides in leached-out chernozem was studied. The amine salt of 2,4-D, sesone, falone, solan, dalapon and TCA, applied in doses of 1 to 8 kg/ha, were fully eliminated from the soil in about 2 months. When larger doses were used, the residues persisted for 5 to 11 months within the upper 10 cm soil layer. Triazine and urea derivatives were the most persistent of all herbicides tested. When applied in doses of 1-3 kg/ha, their residues persisted in the soil for 2 to 2.5 months, and residues were detectable for 1 to 3 years when they were applied at rates of 10 kg/ha or more.

75-0535. Luquet, F. M.; Goursaud, J.; Casalis, J. (ENSIA, Douai, France). **Les residus de pesticides organochlores dans les laits animaux et humains. [Organochlorine pesticide residues in animal and human milk.]** *Lait 54(535-536): 269-301; 1974.* (1 reference) (French)

Since organochlorine compounds are highly stable, slightly soluble in water, and highly soluble in lipids, milk is especially vulnerable to residue accumulation. The subject is extensively reviewed in relation to French statistics, legislation, and official studies on butter, animal milk (cow, sheep, goat), and human milk. The processing of dairy products and veterinary medical procedures are also investigated. Pollution of animal milk in France was generally reduced in 1972 to about one-fourth its 1969 value. The yearly national average of general pollution levels in cows' milk breaks down as follows: BHC + hexachlorobenzene (HCB), 0.2 mg/kg of lipids; heptachlor epoxide (HCE), 0.15; dieldrin, 0.05; and DDT and derivatives, 0.08, all below commonly accepted tolerance levels. In northern France the figures are 0.35 for BHC and 0.38 for heptachlor epoxide, and the national figures for HCE and dieldrin have increased since 1969. Figures for human milk pollution are higher: BHC 1.77, HCB 0.98, HCE 0.28, dieldrin 0.23, DDT-TDE 3.24. Cows have more and lengthier lactations than human mothers and a higher ratio of milk production to body weight, and the organochlorine residues are more readily excreted into the lipid-rich milk than elsewhere. The French government is presently prohibiting the use of organochlorine pesticides in agriculture.

75-0536. Gay, L.; Baumgartner, E.; Rinderknecht, F.; Wicki, J.; Egli, H.; Massarotti, A.; Ramuz, A.; Berner, C. (Author address not given). **Mitteilungen aus der Laboratoriumspraxis. (Aus den Jahresberichten amtlicher Laboratorien). [Reports from laboratory practice. (Excerpts from annual reports of official testing laboratories).]** *Mitt. Geb. Lebensmittelunters. Hyg. 65(3): 303-329; 1974.* (German, Italian, French)

Excerpts from the annual reports of official food and materials testing laboratories in Switzerland are presented. The pesticide residue investigations, encompassing some 500 different preparations, were carried out by routine methods, but new methods, such as combinations of gas chromatography with a biological inhibition test as well as mass spectrometry, have also been used. Routine investigations and checkups of fruits, vegetables, meat and dairy products, and eggs show a general tendency toward declining residue levels especially in domestic products, while imported foods, especially eggs and lettuce, are sometimes not accepted due to high levels of organochlorine pesticides and dithiocarbamates, respectively. Investigations of organ samples from infants who died at ages of 1 day to 7 yr revealed hexachlorobenzene residues of 1.2 ppm in fatty tissue, 0.2 ppm in the brain, 0.6 ppm in the kidney, and 0.9 ppm in the liver. The corresponding DDT and DDT metabolite levels in the same organs were 3.5 ppm, 0.25 ppm, 1.0 ppm, and 2.6 ppm. The pesticide residue levels increased in the order brain, kidney, liver, and adipose tissue.

75-0537. Gruebner, P.; Beitz, H.; Goedicke, H. J.; Seefeld, F. (Pflanzenschutzamt des Bezirkes Dresden, Dresden, DDR). **Rueckstandsprobleme bei der Pflanzenschutzmittel-Anwendung im Gemuesebau unter Glas und Plasten. [Residue problems in herbicide application to vegetables grown under glass or plastic.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 28(10): 198-203; 1974.* (10 references) (German)

The special pattern of the residue dynamics of plant protecting agents in and on vegetables grown under glass and plastic covers was studied to derive special rules for the application of pesticides under these conditions. The degradation and elimination of pesticides from vegetables grown under field conditions is facilitated by meteorological factors: precipitation, wind, UV irradiation, and evaporation. In heated greenhouses

where pesticides usually have to be used at higher rates, degradation and elimination are facilitated by the high temperature and the increased intensity of metabolic processes (stepped-up enzymatic degradation). These factors facilitating degradation are absent in unheated greenhouses. On the other hand, the initial concentrations of the pesticides under field conditions are usually lower than under greenhouse conditions. Dusting and pour-on methods are not suitable for greenhouses, while atomization techniques, especially the hot-fogging method, result in very low initial residue concentrations, sometimes even below the maximum allowable level, and rapid degradation of the residues.

75-0538. Beitz, H.; Dunsing, M.; Seefeld, F. (Inst. Pflanzenschutzforsch. Kleinmachnow, Biol. Zentralanstalt Berlin, Kleinmachnow, DDR). **Rueckstandstoxikologische Probleme bei der Beizung von Pflanzkartoffeln. [Toxicological problems with residues from disinfection of potatoes for planting.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 28(10): 203-207; 1974.* (7 references) (German)

The residue dynamics of chloramphenicol, zineb, maneb, benomyl, and quintozene were studied in seed potatoes dressed with Bercema-Antispor 6459, BC 6460, BC 6462, BC 6464, and FL 208 preparations containing the above active ingredients before winter storage. The antibiotic and pesticide residue levels measured at the beginning and end of the storage period were nearly identical, i.e., there was hardly any decomposition of the active principles during the winter storage period. As most of the residue was adsorbed on the surface of the potatoes, it was possible to reduce their levels to below the maximum allowable values by thorough washing and steaming. After such treatment, dressed potatoes can be fed to pigs weighing over 30 kg.

75-0539. Norton, J. L. (Tulsa City-County Health Dept., Tulsa, OK). **The identification and measurement of chlorinated hydrocarbon pesticides accumulated from urban runoff.** *IN: National Technical Information Service PB-266-307, 1973, 29p.* (10 references)

A total of 198 samples of runoff and Arkansas River water from the metropolitan area of Tulsa, Oklahoma were analyzed for chlorinated hydrocarbons during the period March 1970 through June 1972. Sampling at 15 sites was conducted in 3 phases: Arkansas River water above and below the metropolitan area, storm drainage basins at maintenance flow, and storm water runoff. Measurable quantities of lindane, heptachlor, heptachlor epoxide, aldrin, and dieldrin enter the Arkansas River from the Tulsa metropolitan area via the Joe Creek drainage basin and the 21st Street drainage basin. Residues in runoff water occurred most often in late winter, spring, and early summer, coinciding with periods of heaviest pesticide use, highest rainfall, and most runoff. Water released from Keystone Dam did not contain residues, either because they were diluted below detectable limits or because the pesticide load borne by the Arkansas and Cimarron Rivers is being retained in the reservoir. Grab sampling of natural waters for chlorinated hydrocarbon pesticide analysis did not satisfactorily monitor the problem. Lead and chromium were the only heavy metals identified entering the Arkansas River from drainage basin outfalls. It was suggested that heavy metal introduction to the river from storm water runoff probably occurs in high concentrations for a relatively short period of time. (Research Project Technical Completion Report, Oklahoma Water Resources Research Institute Project No. B-013-OKLA)

75-0540. Laboratory of Insect Pest Control (Nat. Inst. Agr. Sci., Min. Agr. and Forestry, Tokyo, Japan). **[Behavior of BHC scattered on paddy fields.]** *Nogyo Gijutsu Kenkyusho Nenpo (Annu. Rep. Nat. Inst. Agr. Sci.) 38-42; 1973.* (Japanese)

The behavior of BHC isomers when BHC granules were scattered on paddy fields is discussed, based on the results of experiments in which the four principal isomers (α-, β-, γ-, and δ-) were separately traced under conditions simulating those in which BHC granules were scattered on paddy fields. The elution rate from granules was, in decreasing order, $\delta > \gamma \gg \alpha \gg \beta$. The elimination by evaporation was most rapid in α-, followed by γ; however, δ and β were rather concentrated in water. The adsorption to soil was stronger for β and δ. Degradation in soil, possibly by soil microorganisms, was most speedy in the case of γ, followed by α, which was related to the fact that γ was most easily dehydrochlorinated, followed by α and δ in that order. These facts explain the observation that the elimination of γ was very rapid, while β persists longer in paddy fields. The situation differs in dry upland fields, and the γ-isomer still remains in upland soil in Japan as in other countries.

75-0541. Jensen, S.; Johnels, A. G.; Olsson, M.; Otterlind, G. (Nat. Environ. Protect. Board, Stockholm, Sweden). **DDT and PCB in herring and cod from the Baltic, Kattegat and Skagerrak.** *Oikos 15(Suppl.): 230-231; 1973.*

DDT and polychlorinated biphenyl pollution has been studied in Swedish waters. The highest levels of DDT substances in herring occurred in the central southern part of the Baltic, 6.3-250 ppm in extractable fat in 267 analyses, with the mean level about 47 ppm (2 ppm on fresh tissue basis). In the northern Baltic Sea, levels in 201 analyses were 1.8-66 ppm, mean about 13 ppm (0.5 ppm in fresh tissue). West of Bornholm, levels in 70 analyses were 1.6-66 ppm, mean level about 18 ppm, and off the Swedish west coast 86 analyses gave 0.5-22 ppm with a mean level about 3 ppm. Polychlorinated biphenyl contamination was about the same in the central southern part of the Baltic as in the northern

part. Levels in extractable fat in 468 analyses were 1.8-110 ppm, mean level about 16 ppm (in fresh tissue about 0.3 ppm). In cod mean levels of both DDT and polychlorinated biphenyl residues are lower in extractable fat of the musculature. However, high levels were noted in cod liver, 19-64 ppm for DDT compounds. Effects due to migratory and feeding habits and due to the age of the fish itself are discussed.

75-0542. Edwards, C. A. (Rothamsted Exper. Sta., Harpenden, Herts., England). **Persistent pesticides in the environment, 2nd ed.** *CRC Press, Cleveland, 1973, 170 p.* (634 references)

Though not exhaustive, this review attempts to bring together much of the available comparative data on the amounts of residues in the environment, pointing out the largest residues and showing how they are concentrated from lower organisms into higher trophic levels of the food chain. Tables of data with references indicate DDT, aldrin, gamma-BHC, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, camphechlor, isobenzan, methoxychlor, toxaphene, 2,4-D, 2,4,5-T, and 2,4,5-TP (silvex) in soil, air and water. Extensive tables of occurrences and persistence are also given for pesticides in soil fauna and flora, aquatic invertebrates, fish and aquatic mammals, plants, birds, terrestrial mammals, food, feed, and man. One chapter reviews persistence of arsenicals, mercurials, and non-organochlorine herbicides, fungicides and insecticides. A chapter on minimizing pesticides in the environment includes brief discussions of carbamates and biodegradable organochlorine analogs, better use of pesticides, removal of pesticides, alternative methods of control, governmental establishment of tolerance limits, and recent legislation on the use of pesticides in various countries. Various compartmental models of pesticide movement in the environment are described.

75-0543. Yates, W. E.; Akesson, N. B. (Univ. California, Davis, CA). **Reducing pesticide chemical drift.** *IN: Pesticide Formulations. W. van Valkenburg, Ed., Marcel Dekker, Inc., New York, 1973, p. 275-341.* (166 references)

Unless better control of the aerial transport of pesticide drift is soon achieved, increasing pollution will force greater restrictions on the use of many valuable but potentially hazardous chemicals. More specific confinement of smaller effective doses to the treated field may be of help. This could be accomplished through reducing the number of small drops in the aerial spray and utilizing the best weather conditions, avoiding turbulent ventilating weather, while spraying. However, even if the applied material were restricted 100% to the treated field, the residues in crops and soils would still be moved in part with the harvested crop and a remainder would be left in the soil to be exposed to potential dust, adsorption, surface washing, or ground water transport from the fields to the general environment. The use of rapidly degradable chemicals, nonhazardous biological techniques such as microbial or virus sprays, and other nonchemical pest control techniques must become of greater importance in the total system of plant protection.

75-0544. Freed, V. H.; Haque, R. (Dept. Agr. Chem., Oregon State Univ., Corvallis, OR). **Adsorption, movement, and distribution of pesticides in soils.** *IN: Pesticide Formulations. W. van Valkenburg, Ed., Marcel Dekker, Inc., New York, 1973, p. 441-458.* (47 references)

Important aspects of pesticide behavior in soils are reviewed to demonstrate some of the physical-chemical principles involved in the behavior of chemicals and to show how the properties of the compound interact with parameters such as temperature, moisture, type of colloidal surface, and the organisms in the soil. Specific topics include adsorption of pesticides; movement, leaching, and diffusion; and decomposition of pesticides in the soil. The application of present knowledge may assist in the development of quantitative relationships which can yield a better understanding of the persistence of chemicals and their behavior in the soil. From such studies may emerge the knowledge required for the safer and more effective use of pesticides.

75-0545. Wassermann, M.; Tomatis, L.; Wassermann, D.; Day, N. E.; Groner, Y.; Lazarovici, S.; Rosenfeld, D. (Dept. Occup. Health, Hebrew Univ., Hadassah Med. Sch., Jerusalem, Israel). **Epidemiology of organochlorine insecticides in the adipose tissue of Israelis.** *Pestic. Monit. J. 8(1): 1-7; 1974.* (27 references)

This paper reports the findings obtained in 1967-71 during an investigation of organochlorine insecticides (OCI) storage in the adipose tissue of Israelis. Specimens of adipose tissue (307) collected during autopsy from Israelis who had no known occupational exposure to organochlorine insecticides were analyzed by the gas chromatographic method for organochlorine insecticides (DDT-derived material; alpha, beta, and gamma isomers of BHC, dieldrin, and heptachlor epoxide). Findings indicate a positive age association for DDT-derived material stored in the adipose tissue of Israelis of both sexes. Males generally were found to store higher amounts of *p,p'*-DDT and total DDT than females. Comparison of adipose tissue from stillborns with tissue from infants showed that DDT increased in the first months of postnatal life, but storage levels of BHC, dieldrin, and heptachlor epoxide remained approximately the same. DDT levels continued to rise with age levels, except for a slight decrease in the 24 through 44 year olds. The highest levels of DDT were found in the age group of 70 and over; second highest were among 45 to 69 year olds. These findings in Israel differ from the authors' earlier findings in South Africa,

Thailand, Nigeria, and Brazil, which revealed the highest concentrations of OCI in the 24 through 44 year olds. A positive age association with DDT storage in all ages was observed in 1965 and 1967 surveys by the authors in people from Kenya and Israel, and by Davies and Milby in the nonwhite population of the USA. In the countries studied, the storage level of DDT and derived material increases with age in the general population up to the age of 45, and either rises of falls after 45 years, depending on the country. This leads the authors to the opinion that the age group of 25 through 44 years may be the most suitable indicator of DDT storage levels in the community. A positive relationship between *p,p'*-DDT and dieldrin storage was also noted. (Author abstract by permission)

75-0546. Mes, J.; Coffin, D. E.; Campbell, D. (Health Protect. Br., Dept. Nat. Health Welfare, Tunney's Pasture, Ottawa, Canada). **Polychlorinated biphenyl and organochlorine pesticide residues in Canadian chicken eggs.** *Pestic. Monit. J. 8(1): 8-11; 1974.* (12 references)

A nationwide survey in Canada of polychlorinated biphenyl (PCB) and organochlorine pesticide residues in eggs revealed an average of less than 10 ppb for both groups of compounds. PCB's and *p,p'*-DDE were found in all samples; at least 95 percent also contained dieldrin and *p,p'*-DDT. Lindane and *cis*- and *trans*-chlordane were present in 75 percent of all eggs. No significant differences were observed among the different regions of the country. (Author abstract by permission)

75-0547. Anas, R. E. (Northwest Fish. Cent., Nat. Mar. Fish. Serv., Nat. Ocean. Atmos. Admin., Seattle, WA 98112). **DDT plus PCB's in blubber of harbor seals.** *Pestic Monit. J. 8(1): 12-14; 1974.* (12 references)

Samples of blubber from 13 harbor seals (*Phoca vitulina richardii*) were collected in 1971 from San Miguel Island, Calif.; the Columbia River, Oreg.; Puget Sound, Wash.; and the Pribilof Islands, Akaska. Total amounts of DDT plus PCB's ranged from 380.7 to 2,350.0 ppm in five San Miguel Island seals; 459.4 to 1,620.0 ppm in two Puget Sound seals; 27.7 to 109.9 ppm in three Columbia River seals; and 6.8 to 27.8 ppm in three Pribilof Islands seals. There was no indication of loss of total DDT plus PCB's in three samples reanalyzed after 2 years in frozen storage. (Author abstract by permission)

75-0548. Clark, D. R., Jr.; McLane, M. A. R. (Fish Wildl. Serv., Patuxent Wildl. Res. Cent., Laurel, MD 20811). **Chlorinated hydrocarbon and mercury residues in woodcock in the United States, 1970-71.** *Pestic. Monit. J. 8(1): 15-22; 1974.* (9 references)

During late 1970 and early 1971, 229 woodcock (*Philohela minor*) were collected from 23 Eastern and Midwestern states. Analyses for chlorinated hydrocarbons and mercury in these migratory birds showed generally low levels which are not considered dangerous to human consumers. In this survey, Louisiana woodcock had lower residues of heptachlor epoxide and DDE than those tested in a 1965 survey. PCB levels, however, may have increased. Mirex levels were greatest in Mississippi and Louisiana woodcock. Pooling of birds and averaging of individually analyzed birds did not provide equivalent estimates of equivalent residues; pool values tended to be larger and more variable. Levels of six chlorinated hydrocarbons and mercury were negatively correlated with the latitude of the collection site. However, this relationship seemed weakest for PCB's. Among eight chemical residues, PCB levels were most often correlated with levels of the other seven. Levels of chlorinated hydrocarbons in wings were correlated with levels in breast muscle and in carcass; however, mean levels of certain residues differed significantly among wing, muscle, and carcass, even when compared on a lipid basis. (Author abstract by permission)

75-0549. Ginn, T. M.; Fisher, F. M., Jr. (Bowman Gray Sch. Med., Winston-Salem, NC 27103). **Studies on the distribution and flux of pesticides in waterways associated with a ricefield–marshland ecosystem.** *Pestic. Monit. J. 8(1): 23-32; 1974.* (30 references)

On coastal prairie and marshland in Chambers County, Tex., authors studied the distribution and flux of chlorinated hydrocarbon pesticides in waterways associated with a ricefield-marshland ecosystem. Aldrin applied with seed rice entered the aquatic ecosystem through drainage of flooded ricefields. Chemical alteration of the pesticide was observed; dieldrin was the primary breakdown product. All insecticides were distributed unevenly, exhibiting a predilection for biotic components of the ecosystem. Residue analyses of representative species of the aquatic biota indicated significant biological accumulation and passage of these refractory compounds along the food chain. Rapid localization and concentration of pesticides in living organisms was observed. Reproductive tissues exhibited a marked affinity for the pesticides. Decline of assimilated residues in both biotic and abiotic components appeared to follow a first-order reaction curve. Contamination of the aquatic environment with toxaphene during the study period resulted in a massive kill of aquatic organisms. Neither long-term effects nor significant biological magnification of toxaphene was observed. Other chlorinated hydrocarbon pesticides of unknown origin were detected, including DDE, DDD, and DDT. (Author abstract by permission)

75-0550. Law, L. M.; Goerlitz, D. F. (U.S. Dept. Inter., Geol. Surv., Menlo Park, CA). **Selected chlorinated hydrocarbons in bottom material from streams tributary to San Francisco bay.** *Pestic. Monit. J. 8(1): 33-36; 1974.* (21 references)

As part of a study of the environmental quality of San Francisco Bay, bottom material from 26 streams tributary to the Bay were analyzed for chlordane, DDD, DDE, DDT, and PCB residues. These compounds were present in essentially all streams tested. Chlordane proved to be ubiquitous, with a concentration range similar to that of the other compounds. Noteworthy was the occurrence in one stream of polychlorinated naphthalene residues. Compounds occurring in concentrations above 20 μg/kg were identified in most instances by combined gas chromatography/mass spectrometry. (Author abstract by permission)

75-0551. Reidinger, R. F., Jr.; Crabtree, D. G. (U.S. Agency Int. Develop., Philippines APO 96528, San Francisco, CA). **Organochlorine residues in golden eagles, United States–March 1964-July 1971.** *Pestic. Monit. J. 8(1): 37-43; 1974.* (14 references)

Since 1964, golden eagles (*Aquila chrysaetos*) collected dead, dying, or incapacitated in the United States have been analyzed for organochlorine residues under the National Pesticides Monitoring Program. This paper reports residues found in 134 brain, heart, kidney, liver and muscle (BHKLM), 73 brain, and 102 fat samples representing 169 golden eagles from 22 States. DDE was found most frequently, and usually in the greatest concentrations, in each sample type. Dieldrin was also common. Heptachlor epoxide, polychlorinated biphenyls (PCB's), DDD, DDT, endrin, DDMU (1-chloro-2, 2-bis [*p*-chlorophenyl] ethylene), and aldrin were found less frequently. Variability of residue levels was great for all types of samples, and no regional patterns were evident. The data suggest that exposure to organochlorine pesticides has remained relatively constant from 1965 through 1970. Exposure is apparently through diet and not sufficient to warrant concern for direct nonsynergistic acute toxic effects. Sublethal effects are not precluded, however. Of the 188 eagles found, 63 were examined for immediate cause of mortality. The most frequent causes appeared to be shooting and contact with power lines. Of the 169 eagles found, necropsy or residue analysis suggested death by unnatural cause for 63. Of these, deaths due to shooting or contact with power lines were most common: other factors included trapping, collison with vehicles, and chemical poisoning. The remaining 106 birds died from undetermined causes which undoubtedly included a high proportion of natural deaths. (Author abstract by permission)

75-0552. Reimold, R. J.; Durant, C. J. (Univ. Georgia Mar. Inst.,Sapelo Island, GA 31327). **Toxaphene content of estuarine fauna and flora before, during, and after dredging toxaphene-contaminated sediments.** *Pestic. Monit. J. 8(1): 44-49; 1974.* (6 references)

This paper evaluates toxaphene concentration in selected estuarine fauna, flora sediment, and dredge spoil before, during and after the dredging of Terry Creek, Brunswick, Ga., in autumn 1972. This is the second effort to widen the channel of the creek, which receives the effluent from a nearby toxaphene-manufacturing plant; a 1971 dredging effort was aborted by the State of Georgia. The current study employed safeguards inspired by the 1971 State action: enclosure of dredge spoil in diked areas of unproductive marshland to prevent runoff, and weekly monitoring of Terry Creek biota and sediment to detect the possible role of toxaphene in any resulting disturbance to the balance of nature. Monitoring of dredge spoil, fauna, and flora showed toxaphene concentrations to be higher during dredging than before or after. Eastern oysters (*Crassostrea virginica*), reported to be among the best biological monitors, did not demonstrate large changes in toxaphene content resulting from the dredging. The high toxaphene concentration in oysters ranged between 2.0 and 5.0 ppm. The best indicators evaluated were salt marsh cordgrass (*Spartina alterniflora*) and mummichog (*Fundulus heteroclitus*). The highest content found in *S. alterniflora* was 7.5 ppm; the highest concentration in *F. heteroclitus* was over 200 ppm. (Author abstract by permission)

75-0553. Andrews, T. L. (Pacific Southwest Forest Range Exp. Sta., Forest Serv., U.S. Dept. Agr., Berkeley, CA 94701). **Resmethrin residues in foliage after aerial application.** *Pestic. Monit. J. 8(1): 50-52; 1974.* (5 references)

The residue present after aerial application of 0.05 and 0.15 lb per acre of the synthetic pyrethroid, resmethrin, was analyzed on three kinds of foliage and in water samples. The compound was identified by thin-layer chromatography (TLC) detecting from 0.06 to 0.25 ppm. The residue on aspen and Douglas fir showed that the initial deposit was light, and no detectable amount was found after seven days. The highest residue, 1 ppm, was found on willow taken the day of insecticide application. No detectable quantities were found in the water samples. (Author abstract by permission)

75-0554. Miller, F. M.; Gomes, E. D. (Texas State Dept. Health, 152 E. Stenger, San Benito, TX 78586). **Detection of DCPA residues in environmental samples.** *Pestic. Monit. J. 8(1): 53-58; 1974.* (10 references)

DCPA was detected in river water, five species of fish, and air in the lower Rio Grande Valley of Texas. Its presence was determined by electron-capture gas-liquid chromatography and confirmed by several analytical methods. Analyses of water samples taken over a 2-year period usually indicated less than 1 ppb DCPA in water during both years. Residues in one freshwater and four saltwater fish species varied from less than 1 ppb to 8 ppm. DCPA was found in air samples for several months following use in a vegetable growing area. (Author abstract by permission)

75-0555. Winterlin, W.; Mourer, C.; Bailey, J. B. (Dept. Environ. Toxicol., Univ. California, Davis, CA 94720). **Degradation of four organophosphate insecticides in grape tissues.** *Pestic. Monit. J. 8(1): 59-65; 1974.* (8 references)

Four organophosphate pesticides were applied to field-grown grapes at maximum recommended rates for pest control in Fresno County, Calif. Periodic sampling and analyzes were carried out for each pesticide immediately before and following application on leaves, bark, cane, fruit, and soil. At harvest time 42 days after the initial application, azinphosmethyl and ethion residues were found on leaves at approximately 20 percent and 2.5 percent, respectively, of their original levels. Phosalone, applied 14 days after the azinphosmethyl and ethion treatment, still had about 30 percent of its original residue at harvest time naled residues were not detected (> 0.10 ppm) 4 days after application. Residues on cane and bark were quite stable and accounted for a relatively high percentage of the total residues found on the plant at harvest. Total extracted residues found on the plant at harvest amounted to approximately 280 ppm. (Author abstract by permission)

75-0556. Maskell, F. E.; Gair, R.; Williams, J. H.; Cooper, B. J. (Agr. Develop. Advisory Serv., Cambridge, England). **Effects of phorate placement on carrot fly control, seedling density and terminal residues in the crop.** *Pestic. Sci. 5(5): 543-548; 1974.* (9 references)

The application of granules containing 10% phorate at 1.12, 2.24 or 4.48 kg a.i./ha in a narrow slit together with carrot seed significantly reduced seedling emergence in both a mineral and peat soil. When the granules were applied at 2.24 or 4.48 kg a.i./ha in a narrow slit 2.5 cm below the seed, seedling emergence was adversely affected only at the higher rate in the mineral soil. Phorate granules applied with the seed in the peat soil gave a significantly lower plant density than when applied below the seed, but subsequent carrot yields were unaffected because much larger roots were produced. All phorate treatments gave effective reduction of carrot fly larval damage to the roots. On the peat soil, there were significant increases in total phorate residues present in mature carrots with increasing rate of phorate granules placed with the seed. Placement of the granules 2.5 cm below the seed resulted in a 50% reduction in total residues of phorate in whole carrots compared with placing the granules with the seed. Residues resulting from 1.12 kg a.i./ha with the seed or 2.24 kg a.i./ha 2.5 cm below the seed were not significantly greater than residues in untreated carrots. (Author abstract by permission)

75-0557. Dejonchkeere, W.; Steurbaut, W.; Dynoodt, R.; Kips, R. H. (Dept. Crop Protect. Chem., Fac. Agr. Sci., State Univ., Ghent, Belgium). **Uptake and translocation of dimefox and schradan in hops.** *Pestic. Sci. 5(5): 549-554; 1974.* (4 references)

During the 1971 growing season an experiment was carried out to study the uptake, translocation and residue levels of dimefox and schradan in hops after applying a soil drench of Terra-Sytam (222 g/liter dimefox–20 g/liter schradan) at various times in varying concentrations. Residue analysis shows that the dimefox concentration in the hop plants reaches a peak about one week after application, which increases with the amount applied. Then a gradual breakdown sets in so that at the time of harvesting the differences between the dosages have virtually disappeared. Translocation of dimefox in the hop plant is very rapid, but the breakdown is faster at the top of the plant. Schradan concentrations were usually very low and residues at harvest time negligible. (Author abstract by permission)

75-0558. Stringer, A.; Pickard, J. A.; Lyons, C. H. (Univ. Bristol, Long Ashton Res. Sta., Bristol BS18 9AF, England). **The accumulation and distribution of *p,p'*-DDT and related compounds in an apple orchard. I. Residues in the soil.** *Pestic. Sci. 5(5): 587-598; 1974.* (24 references)

Soils from an orchard sprayed annually (1953-1969) with technical DDT (77% *p,p'*-DDT and 22% *o,p'*-DDT) were analyzed for residues from 1964 until 1969. The amount of DDT found after 17 years was 21% *p,p'*-DDT out of 27.1 kg/ha applied, and 7% of *o,p'*-DDT out of 7.6 kg/ha. The vertical distribution of residues (*p,p'*-DDT, *p,p'*-DDE, *p,p'*-TDE and *o,p'*-DDT) showed a linear relationship between log amount and depth, with approximately 80% in the top 10 cm of soil. At depths from 50 to 210 cm, residue values were too small to be determined (i.e. > 1 ng/g dry wt). The surface distribution in the orchard showed a systematic pattern of circular areas of residues, with maximum value centered at each trunk (7.5 μg/g) and decreasing rapidly to each alley (1.9 μg/g). The levels of *p,p'*-DDT had reached a steady state (3–4 kg/ha) and the half-life time was calculated as 3.0 years. *p,p'*-DDE (1.8 kg/ha) was the main metabolite of *p,p'*-DDT. Small amounts of *p,p'*-TDE were also found. *o,p'*-DDT was less persistent than *p,p'*-DDT, with a half-life time of 1.5 years. (Author abstract by permission)

75-0559. Gindrat, D.; Vallotton, R.; Neury, G. (Sta. Fed. Rech. Agron., Lausanne, Switzerland). **Essais de desinfection chimique du sol en culture maraichere. [Tests of the chemical fumigation of soil for truck gardening.]** *Rev. Suisse Viticult. Arboricult. Hort. 5(5): 149-156; 1973.* (21 references) (French)

In connection with tests of the herbicidal, fungicidal and nematocidal effectiveness of methyl bromide and other agents, determinations were made by the Heuser method of the bromine content of vegetables grown outdoors in 5 X 5 meter lots. Application of

methyl bromide to the soil was made by the Terabol method, usually one to two weeks prior to planting. Crops tested included fennel, lettuce, endive, cauliflower, turnip, cucumber, eggplant, and tomato. Tests gave values definitely in violation of bromine safety levels (more than 30-40 ppm) with the exception of cucumbers (waiting period before planting: 10 days), but in this case the pesticidal results were also unsatisfactory. Tomatoes planted 196 days after treatment tested at 25 ppm but treatment results were unsatisfactory. Bromine content of tomatoes varied according to plant height. Methyl bromide is not recommended for food crops.

75-0560. Takeda, M.; Nishikawa, M.; Uyeta, M.; Matsunaga, K.; Kashimoto, T.; Narafu, T.; Minagawa, O.; Sakai, K.; Mori, K.; Otsuki, K.; Sekita, H.; Tanabe, H. (Nat. Inst. Hyg. Sci., Tokyo, Japan). **Pesticide residues in dairy products and meat. I. Organochlorine pesticide residues in milk.** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 13(4): 299-309; 1972.* (13 references)

The seasonal distribution of organochlorine pesticides in raw milk and in commercial milk was studied during the period January 1970 to March 1971. In general, in the western area of Japan where organochlorines are used in much greater quantity on the fields, the pesticide residue levels in milk were significantly higher than in the Hokkaido and Miyagi prefectures. The residues of BHC isomers and total BHC were much higher in western Japan. Little difference was noted in the residue levels of other pesticides such as lindane, DDT derivatives, total DDT, and dieldrin. Aldrin and endrin were not detected. During the course of the experiment the level of total BHC residues in milk dropped by about 50%. An examination of various kinds of dairy cow feeds allowed the conclusion that a large portion of BHC in milk was derived from rice straw used in the feed. Organochlorine pesticides were also detected in market milk samples.

75-0561. Sakai, K.; Mori, K.; Minagawa, O.; Narafu, T.; Kashimoto, T.; Matsunaga, K.; Uyeta, M.; Nishikawa, M.; Otsuki, K.; Sekita, H.; Takeda, M.; Tanabe, H. (Miyagi Prefect. Pub. Health Lab., Sendai, Japan). **Pesticide residues in dairy products and meat. II. Organchlorine pesticide residues in dairy products.** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 13(4): 310-316; 1972.* (2 references)

Residual organochlorine pesticides were analyzed by gas chromatography in dairy products including 52 samples of modified milk powder, 43 samples of butter, 7 samples of cheese, and 6 samples of skim milk powder during the period from October 1968 to March 1971 in Japan. Butter samples had the highest organochlorine pesticide residues. BHC isomers, 0.10-23 ppm; total BHC, 0.37-31 ppm; DDT plus DDT derivatives, 0.008-5.2 ppm; and dieldrin, trace-0.16 ppm. Modified milk powders ranked second in content of pesticide residues: BHC isomers, not determinable-1.7 ppm; total BHC, 0.014-2.3 ppm; DDT plus DDT derivatives, not determinable-0.57 ppm; and dieldrin, not determinable-0.02 ppm. Residues in cheese were not as high as might have been expected with the high fat content: BHC isomers, not determinable-0.082 ppm; total BHC, 0.001-0.14 ppm; DDT plus DDT derivatives, 0.014-0.12 ppm; and dieldrin, none. The skim milk powder contained the smallest amounts of residues: BHC isomers, not determinable-0.022 ppm; total BHC, 0.006-0.037 ppm; DDT plus DDT derivatives, 0.02-0.035 ppm; and dieldrin, none.

75-0562. Minagawa, O.; Mori, K.; Sakai, K.; Narafu, T.; Kashimoto, T.; Matsunga, K.; Uyeta, M.; Nishikawa, M.; Takeda, M.; Tanabe, H. (Niigata Prefect. Pub. Health Lab., Niigata, Japan). **Pesticide residues in dairy products and meat. III. Organochlorine pesticide residues in fish and shellfish.** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 13(4): 317-325; 1972.* (12 references)

The extent of organochlorine pesticide contamination of fresh and salt water fish and shellfish was investigated in Japan during the period from August 1969 to February 1971. Total BHC residues were in the range of 0.009-0.70 ppm and 0.004-0.21 ppm for fresh and salt water organisms respectively. Corresponding values for DDT plus DDT derivatives were 0.014-0.87 ppm and 0.002-0.15 ppm. For dieldrin the values were 0.000-0.14 ppm and 0.000-0.039 ppm, respectively. Levels of all residues were higher in fresh water than in salt water fish: about 10-20 times higher in BHC isomers, 15 times higher in total BHC residues, 5 times higher in DDT plus DDT derivatives, and about 7 times higher in dieldrin residues.

75-0563. Tate, R. L.; Alexander, M. (Dept. Agronomy, Cornell Univ., Ithaca, N.Y.). **Formation of dimethylamine and diethylamine in soil treated with pesticides.** *Soil Sci. 118(5): 317-321; 1974.* (14 references)

This study was initiated to determine whether selected pesticides can be converted to secondary amines which are known nitrosamine precursors and to establish whether the corresponsing *N*-nitroso compounds might also be generated. Dimethyldithiocarbamate (dibam) and diethyldithiocarbamate were converted in soil to dimethylamine and diethylamine, respectively. Amine accumulation increased if the soil also received glycerol. However, their formation did not result from microbiological reactions. Glyphosate (*N*-(phosphonomethyl)-glycine) was destroyed in soil, but not if the soil was autoclaved. This disappearance was inhibited by glycerol. Mylone (dazomet) (tetrahydro-3,5-dimethyl-2H-1,3,5-thiadiazine-2-thione) was lost at similar rates from autoclaved and nonsterile soil. No secondary amine accumulation was noted. Traces of a nitrosamine

appeared in soil treated with dimethyldithiocarbamate, but not in samples receiving diethyldithiocarbamate, glyphosate, or Mylone. Sodam, the sodium salt of dimethyldithiocarbamate, was used in this study at concentrations similar to the 0.1% foliar spray which is used commercially. Whether the low yield of nitrosamine found in soil treated with this preparation is of toxicological significance and whether the presumed nitroso compound would enter plants consumed by man or potable water supplies is unknown. The concentration of glyphosate used in this study was about 500 times that employed in the field. Thus, the lack of detectable sarcosine or nitrosamine in the soil treated with this high level supports the apparent safety of this herbicide under conditions of normal use.

75-0564. Khan, S. U.; Mazurkewich, R. (Chem. Biol. Res. Inst., Res. Br., Canada Agriculture, Ottawa, Canada). **Adsorption of linuron on humic acid.** *Soil Sci. 118(5): 339-343; 1974.* (17 references)

The interaction of substituted urea herbicides with soil organic matter was studied with particular reference to the adsorption of linuron on humic acid saturated with various cations (Fe^{3+}, Al^{3+}, Cu^{2+}, Zn^{2+}, Ni^{2+}, Ca^{2+}, H^{+}). Such adsorption is best represented by the Freundlich-type isotherm. The relatively low value of 'isosteric' heat of adsorption is consistent with a physical type of adsorption rather than chemisorption or adsorption due to coordination of linuron to cations on humic acid. Evidence has recently been obtained for ion-dipole or coordination types of interaction in linuron adsorption on montmorillonite saturated with certain polyvalent cations.

75-0565. Shevchenko, M. O.; Marchenko, P. V.; Taran, P. N. (Author address not given). **Khimizatsiya sil'skogo gospodarstva i problema pidgotovki pitnoy vodi. [Chemical improvement of agriculture and drinking-water preparation.]** *Vis. Akad. Nauk Ukr. RSR 8: 69-76; 1973.* (42 references) (Ukrainian)

The efficiency of chlorination, ozonization, and adsorption on activated carbon was studied for the removal of organochlorine and organophosphorus pesticide residues from water in the drinking-water preparation process. Even large doses of chlorine caused only a slight reduction in the lindane concentration after prolonged treatment. Chlorination had little effect on simazine, while 2,4-D and trichlorfon underwent practically no reaction with chlorine. Dichlorvos, the metabolite of trichlorfon, formed toxic *O-O*-dimethyl-*O*-1-chloro-2,2,2-trichloroethyl phosphate with chlorine in acid medium. Metaphos (methyl parathion), carbophos (malathion), and dimethoate formed more toxic compounds with chlorine. Ozonization was more efficient than chlorination in the elimination of metaphos and its metabolites; trichlorfon, 2,4-D and its homologs; and in the deodorization of the contaminated water. It was possible to reduce the dimethoate, carbophos, trichlorfon, and dichlorvos levels to the respective maximum allowable concentrations by the use of activated carbon at rates of 0.014-0.039 mg/l, 0.011-0.025 mg/l, 0.015-0.024 mg/l, and 0.012-0.027 mg/l, depending on the type of the activated carbon used.

75-0566. Shal'nova, N. D. (Dept. Food Hyg., F. F. Erisman Moscow Sci. Res. Inst. Hyg., Moscow, USSR). **Gigiyenicheskaya otsenka pishchevykh produktov, obrabotannykh tsikosom. [Hygienic evaluation of food products treated with zykos.]** *Vop. Pitan. 4: 46-49; 1974.* (6 references) (Russian)

Complex hygienic evaluation of apples treated with zykos is described. Apple trees were sprayed on three occasions within the vegetation period at an expenditure of 6 kg/ha. In apples harvested 15 days after the last treatment, the zykos residue levels decreased from 2.89 mg/kg on the fourth day after harvesting to 0.69 mg/kg 10 days later, and further to 0.04 mg/kg in about 45 days. In apples harvested 45 days after the last treatment, the zykos residue level was 0.91 mg/kg on the fourth day after treatment and 0.04 mg/kg on the day of harvesting. Up to 70% of the residue was found in the skin. Fifteen days after harvesting apples still had an aftertaste. The organoleptic properties of apples containing 0.2-0.04 mg/kg zykos were normal, while zykos levels of 0.69 and 0.4 mg/kg influenced the organoleptic properties of the apples. Apples treated with zykos caused no changes in the health status of rats fed such apples for 2 to 6 months.

75-0567. Man'ko, N. N.; Pis'mennaya, M. V.; Akoronko, S. L. (Lab. Hyg. Toxicol. Pesticides, All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers and Plastic Materials, Kiev, USSR). **Gigiyenicheskiye reglamenty fozalona dlya produktov pitaniya. [Hygienic regulations for phosalone content in food products.]** *Vop. Pitan. 5: 62-67; 1974.* (23 references) (Russian)

The maximum allowable phosalone residue level was determined in four varieties of apple, and in tangerines, peaches and currants on the basis of the acceptable daily intake. Following single and repeated sprayings at rates of 0.4-8 kg/ha during the vegetation period, the phosalone residues ranged from 0.04 to 1 mg/kg, 5 to 72 days after application. The residue level decreased with the waiting time, and increased with the pesticide expenditure and number of applications. Great differences in the persistence in different varieties of apple were noted. The maximum allowable phosalone concentration in apples, tangerines, peaches, and currants was established at 0.2 mg/kg. Residue levels below this limit can be achieved by the application of doses of not larger than 2 kg/ha in apples (threefold application), 6 kg/ha in peaches (threefold application), 3 kg/ha in tangerines (single application), and 2 kg/ha in currants (single application).

75-0568. Lahav, N.; Kahanovitch, Y. (Dept. Soil Water, Fac. Agr., Hebrew Univ., Jerusalem, Israel). **Lindane residues in the southern coastal aquifer of Israel).** *Water Air Soil Pollut. 3(3): 253-259; 1974.* (18 references)

Water samples from 12 wells on the coastal aquifer of Israel were analyzed for lindane, BHC isomers, aldrin, TDE, DDT, dieldrin, heptachlor, and heptachlor epoxide, during the period 1972-1973. Lindane was found in 5 wells ranging in concentration from trace amounts to 15 ppt. Alpha-BHC was detected in one well (4 ppt). None of the other pesticides were detected. The wells containing lindane were between 13 and 26 m deep and the soil above the water table was sandy. The most important factors in possible ground water contamination are the rate of water flow through the soil profile, the amount of compound applied, and its adsorption and persistence in the soil. As the half-life of lindane is several hundred days and its mobility in sandy formations is close to that of water, it is not surprising that lindane is found in ground water. Lindane is little used in cultivated areas, but home use of this insecticide is widespread in Israel. Under field conditions where water moves both downward and upward in the upper soil layer and where volatilization occurs, only a limited downward movement of lindane is expected. However, in sewage infiltrated sites, where the flow direction is always downward, lindane can move toward the water table and eventually contaminate the aquifer. This has apparently occurred in wells of Rehovot C and Karmya.

75-0569. Luedemann, D.; Herzel, F. (Inst. Wasser-, Boden-, Lufthyg., Berlin, Germany). **Toxizitaet und zeitliche Konzentrationsaenderung des Insektizids Parathion im Wasser. [Toxicity and chronological change in concentration of parathion in water.]** *Z. Angew. Zool. 60(2): 177-181; 1973.* (2 references) (German)

The ichthyotoxicity and the chronological changes in parathion concentration were studied in aerated and non-aerated aquariums with and without test animals (guppies). The initial parathion concentrations were 0.805, 2.22, 5.52, and 16.25 μg/l. In a 96-hour-test, the parathion concentration decreased most slowly in non-aerated aquariums without fish, somewhat more rapidly in such aquariums with fish, and most rapidly in aerated aquariums, especially in the presence of guppies. At parathion concentrations exceeding 5 μg/l, distinct damage to fish was observed. Some of the animals died before even half the test period was over. More or less pronounced effects on the state of health were observed in all specimens.

75-0570. Gutser, R.; Amberger, A. (Inst. Pflanzenernaehr., Tech. Univ. Muenchen-Weihenstephan, Munich-Weihenstephan, Germany). **Rueckstaende von Harnstoffderivaten, Carbamaten und Amiden in Moehren im Verlaufe der Vegetationszeit. [Residues of phenylurea, phenylcarbamic acid, and acylanilide herbicides in carrots during the vegetation period.]** *Z. Pflanzenkr. Pflanzensch. 81(6/7): 341-355; 1974.* (35 references) (German)

Carrot plants in loamy and organic soils were treated with various doses of CIPC (chlorpropham), BiPC (Alipur), linuron, cycluron, metoxuron, and CMA (Solan) in pot and field trials. The residues of these herbicides were determined quantitatively by a modified Bleidner method after 73, 95, and 117 days. The fully developed carrots in field trials contained no residues when treated with normal doses. Higher doses increased the residue levels above the established tolerance in only a few cases (e.g., 6 X CIPC in organic soil, 3 X linuron in loamy soil). Linuron in loamy soil and CIPC, BiPC, CMA and metoxuron in organic soils caused higher residue levels as a result of different intensity of absorption in the soil. Nearly complete degradation of CIPC in 95 days, and even more rapid decomposition of BiPC were determined. Normal doses of linuron leave practically no residues in carrots after 95 days. The decomposition of the herbicides was faster in leaves than in roots. The latter could not decompose the residues, especially during the last stage of the vegetation period. Small amounts of plant-available herbicides in the soil in the last weeks before harvest cause residues in the roots that may be at the same level or even higher than at earlier stages. Linuron (strong adsorption) and metoxuron in loamy soil (degradation) are inactivated most rapidly.

75-0571. Stamenkovic, T.; Coha, F. (Inst. Plant Protect., Belgrade, Yugoslavia). **Prilog proucavanju dinamike degradacije nekih insekticada na lucerki. [Degradation dynamics of lindane, carbaryl, and diazinon on alfalfa.]** *Zast. Bilja 23(121): 293-303; 1972.* (22 references) (Serbo-Croatian)

The dynamics of the degradation of lindane, carbaryl, and diazinon on alfalfa was studied by gas-liquid chromatographic and spectrophotometric residue analyses. Lindane S-25 was used in doses of 0.2 and 0.4 g/m^2, carbaryl S-50 in doses of 0.5 and 1 g/m^2, and diazinon S-20 in 0.12 and 0.24 g/m^2 doses. The lindane, carbaryl, and diazinon residues fell to the respective maximum allowable concentrations of 1 ppm, about 3 ppm, and about 0.5 in 11, 7, and 4 days.

See also **75-0589** **75-0590** **75-0591** **75-0593** **75-0609** **75-0624** **75-0726** **75-0731**

75-0572. Burgett, M. (Oregon State Univ., Corvallis, OR 97331). **Honey bees and pesticides.** *Agr. Chem. Age 17(8): 6-7; 1974.*

Arsenicals and other inorganic pesticides have been killing honey bees for over 75 years. This problem has become more acute since World War II. The beekeeper indemnity payment program was created as part of the Agricultural Act of 1970. In 1971, Oregon beekeepers reported approximately 3000 honey bee colonies moderately damaged by pesticides, 5000 severely damaged, and 750 killed; in 1973, the figures were 2500, 1500, and 100, respectively. These figures represent 22% of the registered colonies in 1971 and 10% in 1973. Since the figures for 1971 include retroactive pesticide damage claims prior to that year, this does not necessarily reflect a downward trend. The reported losses represent only a portion of the total problem. Reasons for such heavy losses include the application of toxic sprays to blooming crops, using substances which are highly toxic to bees instead of equally efficient but less toxic chemicals, and lack of understanding and cooperation between beekeepers and growers. More knowledge is needed in regard to where losses are occurring, what crops are involved, and what pesticides cause the most damage. Stress can then be placed on the use of less toxic sprays and on more careful timing of spray applications.

75-0573. Mueller, W. J.; Leach, R. M., Jr. (Dept. Poultry Sci., Pennsylvania State Univ., University Park, PA). **Effects of chemicals on egg shell formation.** *Annu. Rev. Pharmacol. 14: 289-303; 1974.* (142 references)

Among the chemicals which affect eggshell formation are substances which may affect matrix formation (lathrogens and Mn), substances that affect calcification (calcium, phosphorus, magnesium, strontium, Vitamin D), and substances that may affect carbonate deposition (carbonic anhydrase inhibitors, zinc, and factors altering acid-base balance). A review of the evidence that DDT causes eggshell thinning is given, with a table describing species differences. Some evidence suggests that DDT effect depends on method of administration and age of the bird. Methoxychlor, lindane, and PCBs do not seem to affect eggshell formation, while dieldrin and parathion have caused shell thinning above certain feeding levels. DDT may interfere with the reproductive endocrinology of birds. It is similar in structure to diethyl stilbestrol and the estrogenic activity of the *o,p'*-isomer has been demonstrated in chickens and quails. Other biochemical effects of DDT observed in avian species have been increased breakdown of blood estradiol concentrations, decreased ^{45}Ca accumulation in bone, hyperthyroidism, hypothyroidism, and inhibition of carbonic anhydrase activity in blood.

75-0574. Swensson, A. (Karolinska Hosp., Stockholm, Sweden). **Organic mercurials used as fungicides.** *Arh. Hig. Rada Toksikol. 24: 307-316; 1973.*

The organic mercurials used as fungicides in agriculture have the general structure R-Hg=X, in which R is usually an organic radical with a carbon-mercury bond and X denotes a more or less dissociable anion, organic or inorganic. The properties of the compound and its effects on animal organisms depend mainly on the organic radical. The anion may influence physical properties such as solubility and volatility. Under practical conditions inhalation is the main route of absorption, although consumption of treated grain and absorption through the skin cannot be ruled out. After absorption the organomercurials are transported to different parts of the body, depending on the specific compound involved. In man, the alkyl mercury compounds produce symptoms, mainly from the central nervous system, which are predominantly ataxic, such as clumsiness in fine movements, difficulties in speaking, dysphagia, and disturbed balance. Sensory disorders are present. Early symptoms include disturbances in superficial sensitivity, paresthesia, and numbness of the lips, tongue, and distal parts of the limbs. Consumption of methyl-mercury containing food by pregnant women can damage the fetus and the child may show the clinical picture of cerebral palsy. Long-term field experience has shown that occupational exposure to organomercurical fungicides can be maintained within safe limits by accepting appropriate technological, protective and medical control measures.

75-0575. Von Burg, R.; Rustam, H. (Dept. Pharmacol. Toxicol., Univ. Rochester, Rochester, NY 14627). **Conduction velocities in methylmercury poisoned patients.** *Bull. Environ. Contam. Toxicol. 12(1): 81-85; 1974.* (12 references)

Electrophysiological techniques were used to investigate the human peripheral nervous system in an attempt to improve identification and early diagnosis of persons suffering from mercury poisoning. Fourteen patients with blood mercury levels between 1000 ng/ml and 3900 ng/ml at the height of exposure were examined 7 months post-exposure when blood mercury levels were between 100 and 800 ng/ml. Seven controls were also studied. Results of this study do not support the theory that methylmercury poisoning resembles peripheral polyneuropathy since clinical electrophysiological testing did not detect any consistent abnormalities even in severely afflicted patients. Except for the determination of the threshold for the H reflex, there was no statistically significant difference between patients and controls. This reduced threshold for H reflex suggests the possibility of lower brain stem damage, which would account for ataxia, tremor, dysmetria, the tendency to flex the arms and fist the hands, and emotional outbursts observed in the poisoned patients. This aspect of electrophysiological investigation should be pursued further.

75-0576. McIntosh, A. (Bionucleonics Dept., Purdue Univ., West Lafayatte, IN 47907). **Notes on the use of**

copper sulfate in ponds. *Bull. Environ. Contam. Toxicol. 12(4): 425-432; 1974.* (7 references)

The efficacy and side effects of controlling dense macrophytic and filamentous algae growth in settling ponds with 1 and 3 ppm copper sulfate were examined. Treatment with 3 ppm copper sulfate resulted in rapid destruction of *Oedogonium* sp., *Potamogeton crispus, Elodea nuttallii*, and other species, although *Elodea* regenerated after 6-8 weeks. Treatment with 1 ppm resulted in only slight damage to *Chara* sp. and *P. crispus*, while *Oedogonium* sp. and *Spirogyra* sp. were controlled. Target species removal was temporary. Deterioration of water quality occurred in treated ponds as plant tissues decomposed. Perceptible odor and discoloration were accompanied by changes in water chemistry, especially decreases in dissolved oxygen. During the period of low oxygen in one pond, extensive damage occurred to nontarget species: green sunfish (*Lepomis cyanellus* R.) present in the pond died, and zooplankton samples indicated that while ostracods survived, cladocera and copepods did not. A combination of low oxygen, hydrogen sulfide production, and copper release by *Chara* was considered responsible for these phenomena.

75-0577. Hall, E. T. (Vet. Div., Health Serv. Command, Dept. Army, Fort Mead, MD). **An apparent case of chlordane poisoning.** *Bull. Environ. Contam. Toxicol. 12(5): 555-561; 1974.* (15 references)

The liver, kidneys, stomach contents, heart blood, and urine of an 8-week-old poodle were analyzed by gas chromatography for residues of chlordane in a suspected case. Seven days prior to the death of the dog, his owner had sprayed several areas of the household with a chlordane emulsion to kill cockroaches. The animal appeared normal until half an hour before he was admitted to the clinic with symptoms of convulsions, hypersalivation, vomiting, and diarrhea. The dog died shortly after admission. High concentrations of technical chlordane were found in all tissue samples. Chromatographs of the extracts from the liver, kidney, blood, and urine showed that epoxidation of the heptachlor peak had taken place, and that the retention times of some peaks were altered. The sizes of some peaks differed from those of the stomach contents and of standard technical chlordane. Residue concentrations ranged from 0.30 ppm in the urine to 402 ppm in the stomach contents. The poodle probably died of chlordane poisoning after chewing on and licking pesticide-treated floor boards.

75-0578. Jirasek, L.; Kalensky, J.; Kubec, K.; Pazderova, J.; Lukas, E. (Second Dermatol. Clin., Dept. General Medicine of Charles Univ., Prague, Czechoslovakia). **Acne chlorina, porphyria cutanea tarda a jine projevy celkove intoxikace pri vyrobe herbicid. II. [Chloracne, porphyria cutanea tarda, and other manifestations of general poisoning during the manufacture of herbicides. II.]** *Cesk. Dermatol. 49: 145-157; 1974.* (40 references) (Czech)

Dermatological changes and systemic poisoning symptoms in 80 workers employed in the manufacture of sodium pentachlorophenolate and the sodium salt and butyl ester of 2,4,5-T are reported. Chloracne; porphyria cutanea tarda; disorders of fat, porphyrin, carbohydrate, and plasma protein metabolism; hepatic lesions; lesions of the peripheral neurons; neurasthenic syndrome; and organic affections were determined in 77 patients. Hyperpigmentation, hypertrichosis, and bullosis actinica and mechanica were diagnosed in 10 of the 11 patients with impaired porphyrin metabolism. The uroporphyrin levels ranged from 172 to 2230 μg/24 hr. In another 12 patients, the uroporphyrin levels peaked at 100 μg/24 hr. Mild steatosis or mild periportal fibrosis of the liver, increased urinary excretion of delta-aminolevulinic acid, increased plasma protein levels, increased alkaline phosphatase activity, and mild hepatomegaly without splenomegaly were found. Symptoms of focal affection of the nervous system, polyneuropathy, psychic disorders, weakness and pain in the lower extremities, somnolence or insomnia, excessive perspiration, headache, and disorders of the mental and sexual functions were noted in 17 patients. While acute pentachlorophenol poisoning was fatal in one case, the above poisonings were due to 2,3,6,7-tetrachlorodibenzodioxin formed during alkaline hydrolysis of tetrachlorobenzene to sodium trichlorophenolate under pressure and at temperatures over 153°C. The formation of this impurity can be controlled by reducing the hydrolysis temperature to below 153°C.

75-0579. Fernando, R. L. (Base Hosp., Matara, Ceylon). **Arsenic poisoning—an occupational hazard.** *Ceylon Med. J. 18: 150-152; 1974.* (6 references)

A group of 8 laborers from a mid hill country tea estate were hospitalized with a history of rash, general malaise, and anorexia. They had in common a history of having sprayed sodium arsenite as an insecticide. This was the first time that insecticide had been used on this estate and the exposure period was about 1 month. The initial medical opinion in these cases was healing papular urticaria due to insect bites. However, arsenic was identified in the specimens of fingernails of all patients. Specific treatment such as dimercaprol was not used at this late stage. The presenting feature of these cases was a maculo-papular rash mainly of the upper and lower limbs, mistakenly evaluated by the dermatologist as due to insect bites. However, organic and inorganic arsenical preparations can produce a sensitization dermatitis after 6 to 10 days, with skin manifestations quite unlike those of chronic arsenical dermatitis, such as spotty brownish pigmentation of face, ears, hands, and feet; hyperkeratosis of palms and soles; and Mees lines in fingernails. Adequate precautions in the disposal and handling of insecticides are essential to prevent such poisonings.

75-0580. Anonymous. **EPA broadens its definition of carcinogen.** *Chem. Eng. News 52(41): 13; 1974.*

The administrator of the Environmental Protection Agency, Russell E. Train, has declared that for purposes of carcinogenicity testing, tumorigenic and carcinogenic substances are the same. This interpretation is in contrast with that of other agencies such as the Food and Drug Administration, which define carcinogenic substances as those which cause cancerous tumors. Because they cause benign and malignant tumors in mice, major uses of Shell Chemical's aldrin and dieldrin pesticides will be suspended. Train defines carcinogenic substances as those which increase the incidence of tumors in exposed animals, decrease the latency period between exposure and tumor onset, or result in unusual tumors. He also refutes the arguments that carcinogens are species specific, and states that it is impossible to establish a "safe level" of exposure to aldrin and dieldrin. Suspension of the major uses and production of about 10 million pounds of the pesticides in 1975 will remain in effect during cancellation proceedings which would permanently ban their production.

75-0581. Matsushima, S. (Saku Gen. Hosp., Usuda, Nagano, Japan). **[Treatment of poisoning by agricultural chemicals and suggestions for prevention.]** *Chiryo (J. Ther.) 56(10): 1839-1847; 1974.* (12 references) (Japanese)

Various aspects in the treatment of pesticide poisoning are discussed on the basis of case histories. After administration of first aid, important initial measures include careful history taking, collection of excreta, observation of toxic symptoms, elimination of toxic agent, and clinical examination. Toxic symptoms, diagnosis, and treatment are tabulated in detail for the major types of pesticides available in Japan. Although the use of organochlorine and organomercury pesticides is prohibited in Japan, individual users have probably retained certain amounts of these compounds, and therefore poisoning cases may still occur. The most commonly used pesticides in Japan today include the organophosphate and *N*-methylcarbamate insecticides, organofluorine miticides and rodenticides, organosulfur fungicides, agricultural antibiotics, herbicides, and nicotine sulfate. Most of the intoxication cases described resulted from acute exposure.

75-0582. Mofenson, H. C. (Poison Control Cent., Nassau County Med. Cent., East Meadow, NY 11554). **The American Association of Poison Control Centers.** *Clin. Pediat. 13: 305-306; 1974.*

A 1950 inquiry into accidents involving children revealed that 51% of the accidents were acute poisonings. Soon after this study appeared, the first Poison Control Center was established in Chicago. This movement culminated in 1958 with the organization of the American Association of Poison Control Centers, involved with the education of the medical profession and the general public as to the potential hazards of household products and medicines and the dissemination of methods for prevention, diagnosis, and treatment of acute poisonings. The association has literature which is available to interested persons; sponsors safety legislation; holds annual meetings to update information on prevention, diagnosis, and treatment; and makes available for public use a series of slides and pamphlets for educational programs. Although the number of reported poisonings in children continues to grow, the mortality has decreased. The poison control center mechanisms have been signficant in this reduction.

75-0583. Lautenschlaeger, J.; Grabensee, B.; Poettgen, W. (I. Med. Klin. A, Univ. Duesseldorf, Duesseldorf, Germany). **Paraquat-Intoxikationen und isolierte aplastische Anaemie. [Paraquat intoxication and isolated aplastic anemia.]** *Deut. Med. Wochenschr. 99(46): 2348-2351; 1974.* (28 references) (German)

Isolated aplastic anemia in three male and two female patients following accidental or intentional ingestion of 10-50 ml paraquat is reported. Rapidly progressing normochromic anemia developed within the first few days after poisoning. No dose-effect relationship was established. Disturbance in the myelopoiesis was observed in the form of toxic granulation and degradation in two cases. The normochromic anemia was accompanied by an isolated aplasia of erythropoiesis in the bone marrow. The other cell systems in the bone marrow showed no or only minimal alterations. The dose-independent damage to erythropoiesis reached its peak after 5-14 days, and showed only a slight tendency to improve. Complete normalization of the blood picture and bone marrow six months after poisoning was determined in one of the two surviving patients.

75-0584. Vermeer, K.; Risebrough, R. W.; Spaans, A. L.; Reynolds, L. M. (Canadian Wildlife Serv., Edmonton, Alberta, Canada). **Pesticide effects on fishes and birds in rice fields of Surinam, South America.** *Environ. Pollut. 7(3): 217-236; 1974.* (19 references)

Large quantities of various insecticides and herbicides are applied annually to an 8000 ha rice-growing project in Wageningen, Surinam, to kill insects, weeds, and snails. The ecological effects of these pesticide applications were studied between October 20 and December 14, 1971. Large fish kills were observed after the spray application of NaPCP, which was used to reduce the numbers of *Pomacea* snails. Fifty snail kites which feed exclusively on these snails were found dead after extensive NaPCP spraying, and high pentachlorophenol residues were found in the tissues of 17 birds subjected to analysis. Egrets, herons, and jacanas were found sick or dead during the period of pesticide application. The levels of pentachlorophenol and endrin in their tissues suggested that the sickness and mortality

were caused by the ingestion of contaminated food. With the elimination of endrin treatment and the substitution of clonitralide for NaPCP, the intensive application of pesticide to the Wageningen rice field would present no appreciable hazard to the avifauna of local ecosystems.

75-0585. Anonymous. **Safe disposal for dangerous empties.** *Farm Chem. 137(10): 40, 42; 1974.*

Fresno County, California, has established a Class I disposal site for hazardous pesticide and herbicide "empties." The site includes a 31-acre stretch of isolated desert which has been fenced and developed to provide disposal space for 600,000 cubic yards of empty drums. California disposal sites are classified into three categories: Class I sites can accept containers of highly toxic water soluble materials; Class II areas are acceptable for decomposable organic materials; and Class III sites are acceptable for relatively inert, nondecomposable substances. At the Fresno County site, discarded drums must be crushed and buried at least 6 feet deep, precautions and decontamination procedures are provided for workmen, and air and surface water are protected from contamination. Reusable containers are recycled after being rinsed; the rinse material is sprayed on crops. Incoming loads average about 300 cubic yards per day; a disposal fee of 75 cents per cubic yard is charged.

75-0586. Nikitina, Ye. I. (N. I. Pirogov Hospital, Kuybishev, USSR). **Techeniye rodov i poslerodovogo perioda u vinogradarey i doyarok v usloviyakh Kryma. [Course of labor and puerperium in the vineyard workers and milkmaids in Crimea.]** *Gig. Tr. Prof. Zabol. 18: 17-20; 1974.* (7 references) (Russian)

The course of labor and the puerperium were studied in 390 vineyard workers, 209 milkmaids, and 100 control subjects. The vineyard workers were exposed to DDT, sulfur, metaphos (methyl parathion), and blue vitriol (copper sulfate). The milkmaids had to perform hard physical work without exposure to pesticides. Miscarriage, premature birth, untimely discharge of the amniotic fluid, toxicosis during the second half of the pregnancy, and primary and secondary uterine inertia (asthenia) occurred more frequently among vineyard workers than among milkmaids or in the control group. Underweight children were born more frequently to vineyard workers than in any of the two other groups. Disturbances of the central nervous system were observed in over 50% of the malformed infants. The milk of vineyard workers contained 4.8 times as much DDT and 6.2 times as much copper as that of milkmaids; 5.6 and 4.7 times as much, respectively, in the placenta. Histological investigations of placentas from vineyard workers revealed fine and closely spaced villi; appreciable deposits of lime; pale infarcts; and leukocyte infiltration in the intervillous spaces, in the villous stroma, the vascular walls of the amnion, and in the basal plate. Female workers exposed to pesticides should be reassigned to other duties involving no exposure for the duration of their pregnancy and lactation periods.

75-0587. Anonymous. **What EPA says about container disposal.** *Farm Chem. 137(10): 42; 1974.*

EPA is encouraging the adoption of recommended procedures for the disposal of pesticide wastes and pesticide containers. Unwanted pesticides should be used as originally intended if possible or should be returned to the manufacturer. If neither alternative is practicable, organic pesticides which do not contain heavy metals may be commercially incinerated and the incinerator emissions treated. Organic pesticides containing heavy metals and most inorganic pesticides should be encapsulated in impenetrable material and buried in specially designed landfills. Properly rinsed containers may be reused or recycled, and the rinse products disposed of in the same way as the original pesticides. Water dumping, open dumping, and open burning are generally not recommended. Disposal practices such as soil injection, well injection, and chemical degradation may be acceptable in specific cases. Highly toxic or moderately toxic pesticides and their containers should be stored in a secured, properly identified, dry, well ventilated, and fireproof room or building.

75-0588. Butenandt, I.; Mantel, K.; Fendel, H. (Universitaets-Kinderklinik, Munich, Germany). **Paraquat-Vergiftung bei Kindern. [Paraquat poisoning in children.]** *Fortschr. Med. 92(16): 677-680; 1974.* (8 references) (German)

Two cases of acute poisoning due to ingestion of Gramoxone (paraquat) by small children are reported, and the pattern of the course of such poisoning is described. Ulcerous stomatitis and pains in the region of the upper respiratory tract were the early symptoms of poisoning in a 4 year old boy who recovered and was discharged from the hospital after 2 weeks. Jaundice, renal insufficiency, ulceration of the oral and anal regions, bronchopulmonary symptoms, progressive cyanosis, pneumothorax, and pulmonary fibrosis were found in a 20 month old boy who died from pulmonary hypoxia on the 21st day following paraquat ingestion. Rapid elimination of the poison by gastric lavage, forced diuresis, activated charcoal, and laxatives is essential for the patient's recovery. Three phases can be distinguished in the evolution of the poisoning: an initial phase of 2 to 4 days without specific poisoning symptoms and with gastrointestinal irritation; a second phase with pharyngitis, esophagitis, gastrointestinal ulcerations, inflammatory processes in the lungs, liver damage with jaundice, and acute renal insufficiency; and a final stage with proliferative changes in the lungs, lung fibrosis, parenchymal hemorrhages, and lung edema. The fibrosis

may lead to death due to general hypoxia within 3 weeks.

75-0589. Ekshtat, B. Ya.; Kurysheva, N. G.; Fedyanina, V. N.; Tarannikova, S. P.; Yanygina, S. F. (Novosibirsk Sci. Res. Inst. Hyg., USSR). **K gigiyenicheskomu normirovaniyu preparatov DD i DDB v vodoyemakh. [Hygienic standardization of DD and DDB compounds in water bodies.]** *Gig. Sanit. 39(9): 11-14; 1974.* (2 references) (Russian)

The complex hygienic assessment of the fumigants D-D and DDB in water bodies is presented. The amounts of DD hydrolyzed in 3 and 10 days in water were determined to be 7.3% and 13.5%. Some 20-25% of DDB was hydrolyzed in 3 days. The maximum allowable DD and DDB concentrations as determined according to organoleptic criteria are 0.62 and 0.8 mg/liter. Both preparations were found to be moderately toxic and cumulative. Reduced reticulocyte count, leukopenia, leukocytosis, increased prothrombin time, increased SGOT and sorbitol dehydrogenase activity, and increased SGPT activity were observed in rabbits and rats fed DD and DDB in a chronic experiment. On the basis of hygienic-toxicological and organoleptic criteria, the 0.4 mg/l level is recommended as the maximum allowable concentration of both DD and DDB in water bodies.

75-0590. Vinogradova, V. K.; Kalyaganov, P. I.; Sudonina, L. T.; Yelizarov, G. P. (Inst. Ind. Hyg. Occup. Dis., Gorkiy, USSR). **Gigiyenicheskaya kharakteristika usloviy truda i sostoyaniye zdorov'ya rabochikh v proizvodstve pentakhlorfenolyata natriya. [Hygienic characteristics of working conditions and health status of workers engaged in the manufacture of sodium pentachlorophenolate.]** *Gig. Tr. Prof. Zabol. 17(8): 11-13; 1973.* (3 references) (Russian)

The working conditions and the health status of workers engaged in sodium pentachlorophenolate production were studied. The combined pentachlorophenol and sodium pentachlorophenolate concentration in the air was between 0.03 and 0.1 mg/m^3 in nearly 60% of all samples, and between 0.21 and 1 mg/m^3 in 19.6% of the samples, compared to a MAC value of 0.1 mg/m^3. Hexachlorobenzene was detected in only a few samples. The pentachlorophenol and sodium pentachlorophenolate concentrations on the clothing and skin were in the respective ranges of 21-212 mg/dm^2 and 17.6-75 mg/dm^2. Exposed workers showed mildly pronounced chronic poisoning with such symptoms as headache, asthenia, irritability, somnolence, rheumatic pain in the limbs, numbness of the hands and fingers, chronic acneiform dermatitis of the face, vegetative-vascular functional disturbances, acrocyanosis, hyperhidrosis, diffuse dermographia, asymmetry of the hand skin temperature, hypertension and hyperesthesia in the distal sections of the upper extremities, relative lymphocytosis, isolated Heinz bodies in the erythrocytes, and eosinopenia. An astheno-neurotic syndrome was diagnosed in 15 cases, and vegetative-sensitive polyneuritis in 2. Reduced protein synthesis in the liver was noted.

75-0591. Selby, L. A.; Case, A. A.; Dorn, C. R.; Wagstaff, D. J. (Coll. Vet. Med., Univ. Missouri, Columbia, MO 65201). **Public health hazards associated with arsenic poisoning in cattle.** *J. Amer. Vet. Med. Ass. 165(11): 1010-1014; 1974.* (40 references)

Most toxicological problems associated with arsenic poisoning in livestock result from mining or agricultural practices. Typical of the history of arsenic intoxication are two recent episodes of acute arsenic intoxication in Missouri cattle herds. In one case, the source of intoxication was presumed to be arsenic residues in waste littering the animals' pasture; in the other case the pasture had been sprayed with herbicide containing DK-80, a weed killer containing 40% sodium arsenite. Laboratory methods of analysis and dynamics of arsenic in the ruminant are discussed. The type and solubility of the arsenic compound, the total dose and exposure time, and the degree of overt intoxication and clinical signs will influence the marketability of the animals and the associated public health hazard. Cattle with chronic arsenic intoxication would probably appear unthrifty and would be unlikely to pass antemortem or postmortem inspection at a slaughter facility. Cattle surviving intoxication with a single dose of arsenic should be withheld from market for at least 14 days, and with multiple exposure affected cattle should be withheld for at least 6 weeks.

75-0592. Maghazaji, H. I. (Dept. Med., Med. Coll., Baghdad Univ., Baghdad, Iraq). **Psychiatric aspects of methylmercury poisoning.** *J. Neurol. Neurosurg. Psychiat. 37(8): 954-958; 1974.* (13 references)

In early 1972, thousands of cases of mercury poisoning were reported among Iraqi farmers who had ingested grain treated with methylmercury fungicide. The psychiatric manifestations exhibited by 43 such persons were studied. Seven percent of these patients presented themselves to the hospital with complaints suggestive of psychiatric disturbances, and 74.4% of the 43 cases under study were consistently depressed; clinically, the depressive symptoms were mild to moderate in degree. The blood mercury levels of the depressed patients were higher than the average values for the poisoned patients as a whole, and considerably higher than those of the nondepressed patients. Irritability was observed in 44.2% of the patients, all but one of whom were under 30 years of age. There was general improvement in the mental states of the hospitalized patients. Mercury binding compounds did not seem to significantly enhance recovery from the depressive state. Differences in the metabolism of inorganic and organic mercury in the brain appear to be responsible for

the clinical psychiatric manifestations in the corresponding types of poisoning–the "mad shaky hatter" as opposed to the "ataxic depressed peasant."

75-0593. Koeman, J. H.; Van Velzen-Blad, H. C. W.; De Vries, R.; Vos, J. G. (Dept. Toxicol., Agr. Univ., Wageningen, The Netherlands). **Effects of PCB and DDE in cormorants and evaluation of PCB residues from an experimental study.** *J. Reprod. Fert. 19(Suppl.): 353-364; 1973.* (32 references)

Tissues of cormorants found dead in various parts of the Netherlands and shot or collected from nests at Naardermeer were analyzed for organochlorines, PCBs, and mercury. Carcasses of the dead birds contained about 0.5-1 g PCB. High PCB levels were also present in tissues from one cormorant which was shot but in very poor condition; this bird and those found dead had low body weights. Mean brain levels in the birds found dead were: HCB 18 ppm, DDE 13 ppm, PCB 190 ppm, heptachlor epoxide 0.14 ppm, dieldrin 1.7 ppm, mercury 1.50 ppm, and methyl mercury 1.46 ppm. Corresponding levels for controls were: HCB 0.65 ppm, DDE 7.8 ppm, PCB 180 ppm (considered high due to one contaminated bird), heptachlor epoxide 0.067 ppm, dieldrin 0.43 ppm, mercury 1.12 ppm, and methylmercury 1.10 ppm. Mean PCB levels in the brains of nestlings were 0.69 ppm. Correlations between eggshell thickness and residue levels were significant for HCB, DDE, and PCB. Shells from eggs that hatched were significantly thicker than shells from eggs that did not hatch in the case of empty shells collected in 1970 from the Naardermeer and Wanneperveen colonies. When cormorants were given PCB orally, 46-79% of the dose administered was retained within the body. Survival times of 55-124 days were correlated with total body PCB contents of 1.12-4.85 g. These values were similar to the levels found in the dead cormorants under natural conditions, indicating that PCBs were probably responsible for deaths of those birds.

75-0594. Aulerich, R. J.; Ringer, R. K.; Iwamoto, S. (Dept. Poult. Sci., Fur Anim. Proj., Michigan State Univ., East Lansing, MI). **Reproductive failure and mortality in mink fed on Great Lakes fish.** *J. Reprod. Fert. 19(Suppl.): 365-376; 1973.* (18 references)

Between 1968 and 1971 experiments were conducted to determine the causes of reproductive malfunction and deaths in minks fed Lake Michigan coho salmon. The minks were found to be extremely sensitive to PCB residues; toxicity varied inversely with the chlorine content of the PCBs. Five feeding experiments were devised using diets varying in fish content and amounts of polychlorinated biphenyls or chlorinated hydrocarbon pesticides. Reproductive failure was noted in females maintained on any diet containing Lake Michigan coho salmon. Only 58% of females receiving Lake Michigan bloater chub whelped and 55% of the young were stillborn. The young of females fed Lake Michigan coho salmon did not survive longer than 24 hours after birth. Body weights for offspring of females fed Lake Michigan bloater chub were lower than those fed control diets. Of minks fed a diet of coho salmon those treated with 30 ppm supplemental PCBs died between the beginning of the breeding season and the end of the whelping period. PCB residues in brain tissue of these minks were 11 ppm and this was approximately twice that in other tissues.

75-0595. Ratcliffe, D. A. (Nature Conservancy, London SW1X 8PY, England). **Studies of the recent breeding success of the peregrine, *Falco peregrinus*.** *J. Reprod. Fert. 19(Suppl.): 377-389; 1973.* (18 references)

In Great Britain in the 1950s, the peregrine, *Falco peregrinus*, showed a marked decline in number and breeding success. This was attributed mainly to poisoning of birds by organochlorine residues. The use of dieldrin, aldrin, and heptachlor is believed to have exerted an adverse effect on the overall reproductive mechanism in the birds. It has been noted that as DDE concentration increases, eggshell thickness decreases, with the relative effect reaching a maximum at lower residue levels and declining as the levels rise. In addition the organochlorine residues are believed to cause basic biochemical disturbances in the peregrine, and these disturbances manifest themselves as abnormal behavioral responses not conducive to successful breeding. Analysis for dieldrin in six adult peregrines found dead or dying in 1971 revealed liver residues ranging from 2.0 to 9.2 ppm; analysis for DDE levels ranged from 5.0 to 50.0 ppm. These toxic substances are implicated in impairment of reproduction and enhancement of premature death.

75-0596. Potts, G. R. (Game Conservancy, Partridge Survival Proj., North Farm, Washington, Pulborough, Sussex, England). **Pesticides and the fertility of the grey partridge, *Perdix perdix*.** *J. Reprod. Fert. 19(Suppl.): 391-402; 1973.* (14 references)

The average annual productivity of the grey partridge (*Perdix perdix*) on British farmland has recently declined. The decline was primarily attributable to an increase in the mortality rate of 1-15 day old chicks; nest losses have also increased. The chick survival rates in the West Sussex area varied greatly from farm to farm between 1968 and 1971. Although partridges in cereal growing areas are exposed to many pesticides during reproduction, no biologically significant and direct effects have been demonstrated in the field. The main indirect effect has been a decline in the traditional weed fauna upon which the birds feed. Together with changing farming systems, this has resulted in malnutrition which has exaggerated other causes of mortality such as predation and disease. Natural variations in the availability of food indicate that the decrease in insects

does not materially affect the chick food supply or cause adverse effects. Predation and disease can sometimes cause heavy mortality even where chick food is plentiful. Broadly based ecological studies are of importance in determining the adverse effects of pesticides, so that more accuracy in the prediction of such effects can be obtained in the future.

75-0597. Katsenovich, L. A. (Uzbek Sci. Res. Inst. Hyg., Sanit., and Occup. Dis., USSR). **Klinicheskaya klassifikatsiya khronicheskoy intoksikatsii, razvivayushcheysya pri sovmestnom i posledovatel'nom primenenii khlor- i fosfororganicheskikh pestitsidov v sel'skom khozyaystve. [Clinical classification of chronic intoxication developing during joint and consecutive use of chlorine- and phosphorus-containing organic pesticides in agricultural practice.]** *Med. Zh. Uzb. 12: 10-14; 1973.* (Russian)

A clinical classification is presented of chronic poisonings developed during joint or consecutive use of organochlorine and organophosphorus pesticides in agriculture, based on extensive clinical experience. Mild poisoning is characterized mainly by vegetative-vascular dystonia, neurocirculatory dystonia, astheno-vegetative syndrome, and hepatopathy, possibly associated with asthenia, polyneuritis, mild toxic anemia, asthmatic bronchitis, myocardial dystrophy, and dermatitis. Since further exposure leads to aggravation of the condition in most cases, all contact with the pesticides should be discontinued. Poisonings of moderate severity are characterized by pronounced astheno-vegetative syndrome, primitive encephalopathy, and moderate chronic hepatitis, but also by toxic anemia, bronchial asthma, myocardial dystrophy, and dermatitis. Partial abatement or stabilization of the disorder follows after cessation of contact with the pesticides; otherwise, rapid progression is inevitable. Pronounced encephalopathy and pronounced chronic hepatitis, organic lesions of the nervous system, myocardial dystrophy, and dermatitis are found in severe forms of poisoning, with such aftereffects as asthenia, encephalopathy, and chronic hepatitis. Stabilization or partial recovery occurs after cessation of exposure.

75-0598. Rogoll, H.; Matthes, P.; Lembcke, G. (Pflanzenschutzamt des Bezirkes Halle, Halle, DDR). **Gesundheits- und Arbeitsschutz beim Umgang mit Pflanzenschutzmitteln in agrochemischen Zentren. [Health and occupational protection during the use of herbicides in agrochemical centers.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 28(10): 207-209; 1974.* (German)

Rules and regulations concerning the handling and application of plant protection agents and pesticides, as set forth in the labor and fire safety regulations issued in East Germany, are presented. The state of the art of health protection and labor safety measures in agrochemical centers specializing in the application of agricultural pesticides is analyzed. Protective clothing, gloves, and rubber boots are required for handling and application of wofatox (methyl parathion), omexan, tinox, dichlorvos, Bi 58 (dimethoate), hedolit, nematin, trakephon, Bi 3411, and fekama AT 25. Respirators must be worn during the preparation of spray solutions and emulsions of these pesticides. Rubber clothing is required for the application of plant protection agents except for triazines and growth regulators. Skin-covering creams must be used when handling all plant protection agents except organophosphorus compounds, captan, and phaltan (folpet).

75-0599. Jany, H. (VEB Ausruestungen Agrochemischer Zentren, Leipzig, DDR). **Probleme und Vorschlaege zur Beseitigung Pflanzenschutzmittel-haltiger Reinigungswaesser in agrochemischen Zentren. [Problems and recommendations concerning pesticide-containing waste water in agrochemical centers.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 28(10): 209-212; 1974.* (German)

Problems and recommendations concerning the cleaning of equipment used in the preparation and application of plant protection agents in agrochemical centers are presented, and the safe disposal of the resulting wastewater is discussed. While residues of the pesticide formulations should be used for plant protection, equipment should be washed centrally on special washing platforms. Diluted with non-contaminated water, the wastewater should be evenly distributed over wastelands and fallows. Pesticide-contaminated wastewaters must not be discharged into biological wastewater treatment plants and receiving streams because of their interference with the biodegradation of organic matter.

75-0600. Knapek, R.; Beitz, H. (Inst. Org. Chem. Ind., Pszczyna Branch, Pszczyna, Poland). **Hygienische und toxikologische Anforderungen an Pflanzenschutzmittel und Mittel zur biologischen Prozesssteuerung fuer ihre Zulassung in der Volksrepublik Polen und der Deutschen Demokratischen Republik. [Hygienic and toxicological requirements concerning pesticides and means of biological process control in order to achieve permission to use them in the People's Republic of Poland and in the German Democratic Republic.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 28(10): 212-214; 1974.* (German)

Bilateral cooperation between Poland and East Germany within the framework of Comecon in the area of pesticides calls for standardized sanitary and toxicological requirements for new pesticides and biological process control agents to facilitate the exchange of research results and division of labor. A scheme of minimum requirements for the preliminary registration of new products for not more than 3 years is presented. According to that scheme, it is necessary to analyze the physicochemical properties of the active principle and the formulation, to assess the toxicological properties, to study its residue behavior and its toxicity in bees and

fish, and to elaborate the sanitary conditions of its application. The acute skin toxicity and the toxicity upon inhalation and ingestion, as well as the subchronic oral toxicity in a 90-day feeding test are determined on rats and other animal species, while rabbits are used for the assessment of skin and eye irritation. The sensitizing properties are studied in guinea pigs. The residue dynamics are studied in soil and water as well as in biological materials of vegetable and animal origin.

75-0601. Tjaij, J. K.; Aziz, D. (Dept. Child Health, Med. Sch., Univ. North Sumatra, Medan, Sumatra). **A mass acute poisoning resembling chlorinated insecticides poisoning but with unknown source.** *Paediat. Indonesiana 11: 23-26; 1971.* (2 references)

In February 1967, 15 cases of acute poisoning (3 children and 12 adults) were reported in Dampung Anggrung, a village near the airfield in Medan, Sumatra. The next day, five more adults were admitted to the hospital with symptoms of poisoning. The symptoms in all affected persons were excitement, dizziness, nausea, tremors, weakness and numbness of extremities, severe vomiting, diarrhea, and clonic convulsions, followed by CNS depressions and respiratory failure resulting in death in two of the children. Other patients responded well to treatment with phenobarbital (60 mg), largactil (10 mg), and cold compresses. Although the cases were similar to those noted after acute poisoning with chlorinated insecticides, the ingestion of insecticides appeared highly unlikely. It was similarly unlikely that the patients had been exposed to insecticide in the form of air pollution.

75-0602. Amin-Zaki, L.; Elhassani, S.; Majeed, M. A.; Clarkson, T. W.; Doherty, R. A.; Greenwood, M. (Univ. Baghdad, Baghdad, Iraq). **Intra-uterine methylmercury poisoning in Iraq.** *Pediatrics 54(5): 587-595; 1974.* (19 references)

The ingestion of homemade bread prepared from wheat treated with a methylmercury fungicide caused a disastrous epidemic of methylmercury poisoning in rural Iraq in early 1972. Laboratory tests and clinical evaluations were performed on 15 infant-mother pairs exposed to methylmercury during pregnancy. In all cases but one, the infants' blood mercury levels were higher than their mothers' during the first 4 months after birth. Thus, methylmercury passes readily from mother to fetus and neonatal blood mercury levels are maintained via ingestion of mercury-contaminated mothers' milk. Clinical manifestations of methylmercury poisoning were evident in six mothers and at least six infants. In five severely affected infants, there was gross impairment of motor and mental development. In only one infant-mother pair was the infant affected and the mother free of clinical signs; this is in marked contrast to reports of Japanese mother-infant pairs from Minamata. Further studies of these and other infant-mother pairs may allow determination of the prenatal period of greatest sensitivity to methylmercury poisoning.

75-0603. Blekherman, N. A.; Il'ina, V. I. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastic Materials, Kiev, USSR). **Deyaki zmini funktsiy yaechnikiv u zhinok, yaki perebuvayut' v kontakti z khlororganichnimi spolukami. [Some changes in ovarian function in women who have been in contact with organochlorine compounds.]** *Pediat. Akush. Ginekol. 2: 57-59; 1973.* (Ukrainian)

Changes in ovarian function were studied in 30 female workers, 21 to 50 yr of age, who had been occupationally exposed to organochlorine pesticides in agriculture. Observed abnormalities included statistically significant increases in the estrogen level on the 7th day of the cycle, reduced rate of estrogen excretion during the luteal phase, and absence of the ovulatory peak with little variation of the excretion curve. The basal temperature measurement can be used as an auxiliary test for evaluating the rhythm of estrogen production. Disturbance in the ovarian-menstrual cycle (hypermenorrhea), inflammation of the appendages, as well as polyps and erosion of the cervix were observed in four cases of acute poisoning with polychlorocamphene (toxaphene).

75-0604. Zelikov, A. Kh.; Danilov, L. N. (Dermatol. Venerol. Cent. No. 15, Leningrad, USSR). **Professional'nyye dermatozy (ugri) u rabotnikov, zanyatykh na proizvodstve 2-4-5-trikhlorfenola. [Occupational dermatoses (acnes) in workers engaged in production of 2,4,5-trichlorophenol.]** *Sov. Med. 7: 145-146; 1974.* (Russian)

A case of chloracne is reported in a 32-year-old worker who had been engaged in 2,4,5-trichlorophenol production for three months. The patient complained of itching of the skin on the face, body, and limbs, and of ulceration of the skin. Yellow coloration of the skin, grayish milia, follicular acneiform papulae, atheromata, and folliculitis were found. Parakeratosis, dilation of the stomata of the hair follicles, polymorphous-cell infiltrations, and perivascular infiltration were found on histological investigation.

75-0605. Nazardinov, F. V.; Spitsin, M. N. (Author address not given). **Opyt primeneniya aminazina pri lechenii ostrykh otravleniy fosfororganicheskimi soyedineniyami. [Experience with the use of chlorpromazine in the treatment of acute poisonings with organophosphorus compounds.]** *Sov. Med. 7: 147; 1974.* (Russian)

Experiences gained in the treatment of acute organophosphate poisoning using the central cholinolytic agent chlorpromazine in combination with atropine and cholinesterase reactivators are reported. In mild cases, chlorpromazine was administered in oral doses of

0.025 g three times a day for 3 days, while cases of moderate severity were treated with 0.05 g oral doses three times daily for 2-3 days. Severe cases required i.m. injection of 2 ml 2.5% solution twice a day for 3 to 5 days. Chlorpromazine fully eliminated the nicotinic symptoms and the pyschomotor excitation during the acute phase of the poisoning, as well as the acute psychoses due to prolonged and intense atropinization. Compared to a control group that received no chlorpromazine, patients treated with this drug showed faster recovery from coma and more rapid normalization of the cholinesterase activity.

75-0606. Muminov, A. I.; Fershtat, V. N. (Dept. Otorhinolaryngology, Tashkent Med. Inst., Tashkent, USSR). **Sostoyaniye verkhnikh dykhatel'nykh putey u rabotayushchikh s kompleksom pestitsidov khlor- i fosfororganicheskikh soyedineniy. [The status of the upper respiratory tract in people working with combinations of organophosphorus and organochlorine pesticides.]** *Vestn. Otorinolaringol. 35(6): 96; 1973.* (Russian)

The status of the upper respiratory tract was examined in 330 subjects who had occupational contact with combinations of organochlorine and organophosphorus pesticides in agriculture and pest control. Pathological changes of the upper respiratory tract were seen in 56±2.7%. Pathological changes in the nasal cavity and its accessory sinuses, in the pharynx, larynx, trachea, and bronchi were seen in 45.7±2.7%, 32.6±2.6%, 7.9±1.5%, and 3.6±3.2% of the subjects, respectively. The incidences of chronic subatrophic and atrophic rhinitis, pharyngitis, and laryngitis were 29.1±2.5%, 24.5±2.4%, and 7.9±1.5%, respectively. Chronic inflammation of the mucous membrane with moderately pronounced atrophic changes was the most characteristic finding. The frequency and type of pathological changes were correlated with the duration of exposure, the working conditions, and the toxicity of the pesticides involved.

75-0607. Simmons, J. R.; Scott, W. A. (Vet. Invest. Cent., Cambridge, England). **An outbreak of metaldehyde poisoning in sheep.** *Vet. Rec. 95(10): 211-212; 1974.* (2 references)

A flock of 23 dry ewes gained access to approximately 2 lb of pellets containing metaldehyde. Of the 10 affected animals 7 died, indicating that even a few ounces of the chemical is toxic to sheep. Convulsions, staggering, mouth-breathing, and lathered saliva around the lips were common. Postmortem examination revealed subcutaneous edema in the neck; the liver was pale and friable, and the trachea and bronchi were full of froth. Petechiae were seen in the mucosa of the urinary bladder and ecchymoses in the epicardium. Ecchymoses in the mucosa of the small intestine resulted in bleeding into the lumen and staining of its contents. It is suggested that labeling which states that the substance is not harmful to farm livestock is not justified and should be changed accordingly.

75-0608. Thorpe, R. M. (The Surgery, Penmellyn, St. Columb, Cornwall, England). **Accidental poisoning.** *Vet. Rec. 95(16): 375-376; 1974.*

A light hunter mare was found standing stiffly and shivering. The animal had convulsions and was found to be hypersensitive and sweating. Masticated remains of bran-like ICI mini leather-jacket pellets were found in the mouth; the pellets contained 1.8% w/w γ-BHC (lindane). Three days previously, three foxhound pups had vomited pellet remains and had had mild convulsions; they recovered the following day. Acepromazine appeared to alleviate the progressively more violent convulsions of the mare. The convulsions began again after 1.5 hr and were not alleviated by i.m. injections of barbiturate sedatives. The animal died 12 hours after ingesting the pellets. The recommended treatment would be early administration of a general anesthetic and gastric lavage if possible. The easy availability and lack of packaging safeguards of many useful but toxic chemicals should be of greater professional concern.

75-0609. Yevdokimov, E. S.; Fridman, Ye. B.; Kozhushnaya, L. I. (Turkmen Sci. Res. Inst. Livestock, Farming, and Vet., USSR). **O diagnostike otravleniy khlororganicheskimi pestitsidami. [Diagnosis of poisonings by organochlorine pesticides.]** *Veterinariya (Moscow) 9: 100-101; 1974.* (Russian)

The possibility of diagnosing poisoning by DDT and BHC in cattle from the residue levels in the blood and organs was studied in spontaneously poisoned animals, and verified in poisoning tests. In cattle showing symptoms of serious poisoning the BHC and DDT levels in the blood were found in a range of 0.001-0.15 mg/ml. At a blood DDT level of 0.003 mg/ml, the DDT concentration was found to be 1 mg/kg in the kidney, 0.8 mg/kg in the heart, 0.6 mg/kg in the brain and muscles, and 0.4 mg/kg in the liver. Traces of DDT were detected in the spinal cord. In another group exhibiting mild symptoms of poisoning the BHC levels in the blood serum ranged from 0.001 to 0.004 mg/ml. Both DDT and BHC were detected in organs and tissues even when no residues were detectable in the blood. The findings indicate the possibility of diagnosing BHC and DDT poisoning in cattle by thin-layer chromatographic determination of the residues in the blood and blood serum. When no residues are detectable in the blood it is still possible to diagnose the poisoning by residue analysis of the internal organs.

75-0610. Pukach, L. P.; Podoprigoda, Z. Ya.; Yerem'yants, A. M.; Shikov, Yu. N. (Author address not given). **O subklinicheskoy forme intoksikatsii fosfororganicheskimi soyedineniyami. [Subclinical form of poi-**

soning with organophosphorus compounds.] *Voenno-Med. Zh. 4: 74; 1974.* (Russian)

The subclinical form of poisoning by trichlorfon and dichlorvos was studied in 84 healthy subjects exposed to these pesticides for one day during disinsection. The subjects displayed no clinical symptoms of poisoning whatsoever immediately upon termination of the exposure. However, statistically significant reduction of the blood cholinesterase activity, leukocytosis, neutrophilia, and reductions in the eosinophil, lymphocyte, and monocyte counts were detected. A follow-up investigation carried out 2 weeks after exposure revealed normalization of the blood picture and slight increase of the cholinesterase activity toward the normal value.

75-0611. Dmitriyev, V. I. (Author address not given). **Porazhayushcheye deystviye khimicheskikh veshchestv, primenyavshikhsya armiyey SSHA v Indokitaye. [Harmful effects of chemical substances used by the US Army in Indochina.]** *Voenno-Med. Zh. 1: 88-90; 1974.* (4 references) (Russian)

The harmful effects of poisons, defoliants, and herbicides deployed by the US Army in Vietnam are described. The herbicides deployed in large amounts destroyed crops, trees, and animals, and also caused poisoning of about 1,293,000 humans. The principal herbicides used in Vietnam were 2,4-D and 2,4,5-T. Sneezing, lachrymation, emesis, headache, irritation of the nasal and oral cavities, and vertigo developed after about 24 hr in subjects exposed to these preparations. The poisoning was fatal in an estimated 300 cases. Asthenia, sleeplessness, and lesions of the eye persisted long after exposure. The mutagenic and teratogenic effects of these preparations were, however, more serious than the direct toxic effects. Increased frequency of chromosomal aberrations, abortion, stillbirth, premature birth, increased postnatal mortality, and especially teratogenesis were observed in pregnant women and their babies. Both 2,4,5-T and 2,4-D were considered responsible for cancer in infants from mothers exposed to these preparations.

75-0612. Anonymous. **The use of mercury and alternative compounds as seed dressings.** *WHO Tech. Rep. Ser. 555: 7-29; 1973.*

The use of alkylmercury compounds as seed dressings should be strictly limited to the treatment of nuclear stocks of cereal seed used for the first few generations of seed multiplication. Arylmercury and alkoxyalkylmercury compounds and hexachlorobenzene should be used to dress cereal seed only if absolutely necessary and if safeguards exist to prevent the seed from being diverted from its intended use; the latter should not be used on cereal seed to be exported for the production of seed. Only dressed seed to be exported for the production of food should be distinctly dyed to distinguish it from food grain. Bags of dressed seed should be adequately labeled and appropriate authorities should be kept informed as to the whereabouts of consignments of dressed grain. An instruction leaflet on the handling and hazards of dressed cereal should be provided for the user in the appropriate language or dialect. National authorities should determine that stocks of alkylmercury compounds are being stored safely, used for an appropriate purpose, or disposed of in a safe manner. Research is needed on the development of low toxicity compounds for seed dressing, methods of producing pathogen-free seed by nonchemical means, the possibility of rendering dressed seed unpalatable and thus unacceptable for use as food, and the development of more effective dyes for identifying dressed grain.

75-0613. Franck, R. (Max-von-Pettenkofer-Institut, Bundesgesundheitsamt, Berlin, Germany). **Lebensmittelrecht – nationale und internationale Entwicklung. [The food law – national and international development.]** *Z. Ernaehrungswiss. (Suppl.) 16: 159-166; 1973.* (German)

General problems of legislation concerning food adulteration, food additives, and residues in West Germany and on an international level are discussed. While maximum allowable residue levels have now been established for 78 active ingredients in plant protection formulations, a total of 260 active ingredients are registered in West Germany. The zero tolerance established for pesticide residues in baby food and dietetic food should be abandoned as unrealistic and meaningless, and replaced either by the limit of sensitivity inherent in the analytical method adopted or by toxicologically tolerable limits. Such limits have been set at 0.01 ppm for most pesticides, at 0.1 ppm for malathion in prepared food, and at 0.01 ppm for aldrin, dieldrin, and other diene derivatives in food products as offered for sale.

75-0614. Gruebner, P.; Meyer, R.; Haensel, H. (Pflanzenschutzamt beim RLN des Bezirkes Dresden, Dresden, DDR). **Zur hygienisch-toxikologischen Ueberwachung des Einsatzes von Agrochemikalien. 1. Mitteilung: Rueckstandskontrollen von Pflanzenschutzmitteln im Gemuesebau des Bezirkes Dresden. [Hygienic-toxicological surveillance of the use of agricultural chemicals. 1. Monitoring of pesticide residues in vegetable gardening in the district of Dresden.]** *Z. Gesamte Hyg. Ihre Grenzgeb. 20: 30-32; 1974.* (14 references) (German)

The organization of the hygienic-toxicological surveillance of the use of pesticides, and of the pesticide residue monitoring in vegetable gardening in the district of Dresden, East Germany, is described. The practice of pesticide residue control in food products is coordinated and linked with surveillance of the use of the pesticides involved to elucidate the causes of unacceptably high residue levels, i.e., short waiting times after application, overdosage, or use in an improper manner. The results of the residue controls are evaluated in cooperation with the hygiene inspection to determine the possible causes

of high residue levels, as a result of which supervisors and workers are advised to improve the methods and rules of pesticide application.

75-0615. De Ferrari, F.; Grandi, M.; Marozzi, E. (Ist. Med. Leg. Assicurazioni, Univ. di Milano, Milan, Italy). **Gli avvelenamenti del settorato medico-legale milanese nel decennio 1961-1970. Dati statistici e considerazioni medico-legali. [Poisonings reported to the Milan medical examiner's office in 1961-1970. Statistical data and forensic considerations.]** *Zacchia 48(2): 257-283; 1973.* (20 references) (Italian)

Statistical data from the Milan medical examiner's office on lethal poisonings from 1961 to 1970 is presented. The overwhelming majority of all poisonings was due to carbon monoxide. Pesticides, especially organophosphorus preparations, were responsible for the deaths of 4 males and 10 females, or 0.98% of all cases. Two cases of homicide, 9 cases of suicide, one case of accidental poisoning, and two as yet undetermined cases were due to organophosphorus pesticides. The death toll due to poisoning by organophosphorus pesticides during the previous ten-year period from 1951 to 1960 was 3 cases or 0.28%.

See also **75-0530** **75-0540** **75-0569** **75-0570** **75-0573** **75-0589** **75-0593** **75-0730**

75-0616. Gyrd-Hansen, N.; Dalgaard-Mikkelsen, S. (Dept. Pharmacol. Toxicol., Royal Vet. Agr. Univ., Copenhagen, Denmark). **The effect of phenoxy-herbicides on the hatchability of eggs and the viability of the chicks.** *Acta Pharmacol. Toxicol. 35(4): 300-308, 1974.* (15 references)

A total of 4500 White Leghorn eggs were injected with or immersed for 10 seconds in solutions of 2,4-D, 2,4,5-T, MCPA, mechlorprop, dichlorprop, or dioxin. In all groups, 84-87% of the eggs were fertile, the average percentage hatch in the control groups (immersed for 10 sec in water at same temperature as herbicides) being 70% and in the untreated groups 73%. The five herbicides had similar embryotoxic qualities: the injection of about 2 mg herbicide per 60-g egg decreased the percentage hatch and, in some cases, the viability of the chicks. Immersion in a 1% herbicide solution had no effect and immersion in a 5% solution had only a moderate effect on the hatchability of the eggs and the viability of the chicks. The embryotoxic effect of 2,7-dichlorodibenzo-*p*-dioxin was at least 100 times that of the herbicides. In the injection experiments, high dose levels caused a large number of malformations among the dead embryos.

75-0617. Mertens, H. W.; Lewis, M. F.; Steen, J. A. (Aviation Psychology Lab., FAA Civil Aeromed. Inst., Oklahoma City, OK 73315). **Some behavioral effects of pesticides: phosdrin and free-operant escape-avoidance behavior in gerbils.** *Aerosp. Med. 45(10): 1171-1176; 1974.* (16 references)

The effects of phosdrin (0.025, 0.05, 0.10, 0.20, and 0.30 mg/kg) on the aversive behavior of gerbils has been studied. A free-operant escape-avoidance task was used with 2 levels of aversive shock (1.5 mA and 1.0 mA). Phosdrin had little effect on simple escape responses until a very high dose level was reached. The dose at which escape behavior was affected caused profound debilitation. Phosdrin interfered with avoidance responses at dose levels lower than those affecting escape behavior. At these lower doses, overt signs of poisoning were also first noticed. Appetitive behavior may be more sensitive than free-operant avoidance behavior to phosdrin effects. Central neural activity is affected by phosdrin doses well below those which affected appetitive behavior. The variation in effect of phosdrin as a function of species and situation in which exposure defects have been studied recalls the need to study phosdrin and other organophosphate compounds used in aerial application with a variety of tasks and species to develop an adequate data base for predicting effects on humans. This study shows that when somatic symptoms of poisoning are first detected, deficits may be simultaneously present in the performance of even the simplest motor tasks. The existence of unnoticed behavioral performance deficits at low levels of exposure not causing observable somatic signs would constitute a hazard to the critical flying task of cropdusting.

75-0618. Suschetet, M.; Leclerc, J.; Lhuissier, M.; Loisel, W. (Sta. Rech. Qual. Aliments Homme, Inst. Nat. Rech. Agron., Dijon, France). **Toxicite et effets nutritionnels chez la rat, de deux herbicides: le piclorame (acide amino-4-trichloro-3,5,6 picolinique) et l'atrazine (chloro-2-ethylamino-4-isopropylamino-6-*s*-triazine). [Toxicity and nutritional effects in rats of two herbicides, picloram and atrazine.]** *Ann. Nutr. Aliment. 28: 29-47; 1974.* (10 references) (French)

Young male and female rats were fed a diet containing 0.01 or 0.1% picloram or 0.01 or 0.05% atrazine for 6 months to study the toxicity and nutritional effects of these herbicides. When administered in a dose of 0.01%, picloram caused slight leukopenia, which was associated with increased mortality, slight relative hypertrophy of the liver, and reduced food utilization in females when it was administered in the larger dose. The growth rate of rats fed 0.01 and 0.05% atrazine decreased, partly because of reduced food uptake, and they showed disturbances in the thiamine and riboflavin metabolism, slight leukopenia, and changes in the relative organ weights. Neither of these pesticides modified the concentrations of thiamine, niacin, riboflavin, and vitamin B6 in the hepatic tissue or caused histopathological lesions. Reduced urea excretion and initial variations in the creatinine excretion as well as in the phosphorus and calcium balances were observed in both groups.

75-0619. Obuchowska, D.; Pawlowska-Tochman, A. (Electron Microscope Laboratory, Med. Acad., Lublin, Poland). **Wplyw gamma izomeru HCH (lindan) na ultrastrukture komorki watrobowej. [The effect of the gamma-isomer of HCH (lindane) on the ultrastructure of the liver cell.]** *Ann. Univ. Mariae Curie Sklodowska (Med) 28(9): 63-66; 1973.* (6 references) (Polish)

The effect of lindane on the fine structure of hepatocytes was studied in albino rats that were administered 50 mg lindane per kg of body weight via stomach tube daily for 6 weeks. As evidenced by electron microscopic examinations, lindane caused enlargement and morphological changes of the mitochondria, hypertrophy of the smooth endoplasmatic reticulum, and a decrease in the glycogen level. These alterations are indicative of the interference of lindane with carbohydrate metabolism in the liver cells.

75-0620. Staszyc, J.; Kifer, E. (Inst. Histol. Embryol., Med. Acad., Lublin, Poland). **Badania histofizjologiczne narzadow szczura znajdujacych sie pod wplywem Foschloru. [Histophysiological study of rat organs under the effect of foschlor.]** *Ann. Univ. Mariae Curie Sklodowska (Med.) 28(11): 75-79; 1973.* (25 references) (Polish)

Cytochemical changes caused by foschlor (2,2,2,-trichloro-1-hydroxyethyl dimethylphosphate) were studied in liver, pancreas, and kidney cells of male albino rats. The animals were administered daily 25

mg/kg doses of foschlor via stomach tube for 9 or 16 days. The first cytochemical changes occurred in the thiamine pyrophosphatase and acid phosphatase activities, indicating changes in the cell metabolism. Organophosphorus compounds affect not only the cholinesterase, but also intracellular enzymes.

75-0621. Krolikowska-Prasal, I. (Inst. Histol. Embryol., Med. Acad., Lublin, Poland). **Wplyw kaptanu na metabolizm komorek watrobowych w swietle badan cytochemicznych. [The influence of captan on the metabolism of liver cells in cytochemical studies.]** *Ann. Univ. Mariae Curie Sklodowska (Med.) 28(12): 81-90; 1973.* (31 references) (Polish)

The effect of captan on metabolic and enzymatic processes in liver cells was studied in guinea pigs that were administered daily 100 mg/kg doses for 7 days (group I) or 21 days (group III), or 1,000 mg/kg doses for 7 days (group II). While there were hardly any cytochemical and enzymatic changes in group I, larger doses in groups II and III increased the intracellular RNA level, and the NADPH reductase and acid and alkaline phosphatase activities, and reduced the succinate and lactate dehydrogenase activities. Captan had no effect on the thiamine pyrophosphatase activity.

75-0622. Hunn, J. B.; Allen, J. L. (Fish Control Lab., La Crosse, WI). **Movement of drugs across the gills of fishes.** *Annu. Rev. Pharmacol. 14: 47-58; 1974.* (43 references)

Data on toxicity, efficacy, and residues of MS-222, quinaldine, and TFM is used to show that lipid solubility and degree of ionization play a significant role in the movement of these compounds across fish gills. Safety to non-target fish of the lamprecide TFM can be predicted on the basis of pKa and LC50 at a particular pH. The effect of pH on TFM toxicity seems to be correlated with the concentration of lipid-soluble free phenol. TFM residues in fish muscle also reflect the unavailability of free phenol at high pH (3.21, 1.5, 0.33, and 0.03 μg/g channel catfish muscle at pH 6, 7, 8, and 9 respectively). Biotransformation of TFM to the water soluble glucuronide reduces its passage across the gills. The TFM concentration in gallbadder bile of rainbow trout exposed to a 5 mg/l solution of TFM was 4.12 μg/ml after 120 minutes, while that of TFM glucuronide was 196 μg/ml. Plasma concentration of free TFM and the glucuronide was 2.73 μg/ml and 0.87 μg/ml respectively during the same time. TFM is promptly cleared from fish muscle during 24 hours of recovery in fresh water. Half-time in blood of rainbow trout injected with 25 mg/kg TFM was 0.78 hours, while a large percentage of the dose is recovered in the bile as the glucuronide.

75-0623. Fishbein, L. (Nat. Cent. Toxicol. Res., Jefferson, AR). **Toxicity of chlorinated biphenyls.** *Annu. Rev. Pharmacol. 14: 139-156; 1974.* (108 references)

The status of the toxicologic, carcinogenic, teratogenic, and mutagenic aspects of the PCBs of greatest relevance to man is reviewed. Summaries of oral and dermal toxicity of Aroclors to rats and rabbits indicate that they are of low acute toxicity. Lethal affects appear to be cumulative. Summaries of PCB-induced pathologic changes show liver alterations and skin lesions to be the most striking change in mammals, whereas fluid in the pericardial sac, kidney damage, and reduced spleen are found in birds. The toxic nature of contaminating polychlorodibenzofurans is pointed out. Effects of low level feeding show reduced rate of weight gain, increased kidney and liver weights, and elevated serum alkaline phosphatase. Morphological and ultrastructural changes in livers of treated rats are described. Acute and chronic feeding studies resulted in fewer and smaller offspring, decreased weanling survival, and lowered mating indices in rats; and body weight loss, eggshell thinning, and poor egg hatchability in chickens. Bladder cancers, hepatomas, lung abscesses, pneumonia, spleen atrophy, intracranial abscesses, hyperplasia and dysplasia of gastric mucosa, fetotoxicity, abortions, maternal deaths, and stillbirths have been observed in mammalian species. A high incidence of chromosomal aberrations has been reported in ring doves, but none was observed in human lymphocyte cultures, rat bone marrow or spermatogonia. Suppressed immunological responses have been observed in ducks, guinea pigs, rabbits, and chickens. An outbreak of PCB poisoning in Japan in 1968 resulted in 1081 patients being affected by chloracne, blindness, gastrointestinal symptoms, skin discoloration in infants of poisoned mothers, decreased birth weights, increased urinary 17-ketosteroids, respiratory distress, a hematological picture suggesting inflammation, and elevated blood-serum triglycerides.

75-0624. Leary, J. S.; Keane, W. T.; Fontenot, C.; Feichtmeir, E. F.; Schultz, D.; Koos, B. A.; Hirsch, L.; Lavor, E. M.; Roan, C. C.; Hine, C. H. (Shell Chem. Co., Houston, TX 77001). **Safety evalulation in the home of polyvinyl chloride resin strip containing dichlorvos (DDVP).** *Arch. Environ. Health 29(6): 308-314; 1974.* (40 references)

In a period of two years a series of three-home studies involving 26 families in Arizona was conducted to further evaluate the safety of the dichlorvos (DDVP)-containing insecticide strip. Physical examination, hematologic and clinical chemistry measurements, blood cholinesterase assays, and analysis of air and food for dichlorvos were carried out. Exposures were designed to be exaggerated in that strips were used throughout the homes (averaging 7 to 11 per home) and replaced with fresh ones, either every three months for one year or monthly for six months. Throughout the studies, all examinations and measurements revealed no adverse effect on health. The red cell cholinesterase activity also remained unaffected. A slight plasma cholinesterase depression of no toxiciological importance was observed

in the study where the strips were replaced monthly over six months. In homes containing 8 to 18 strips, maximum air and food concentrations of dichlovos averaged approximately 0.13 mg/m^3 and 0.12 ppm, respectively. (Author abstract by permission)

75-0625. Lipp, J. A. (Biomed. Sect., Defence Res. Estab. Suffield, Ralston, Alberta, Canada). **Effect of small doses of clonazepam upon soman-induced seizure activity and convulsions.** *Arch. Int. Pharmacodyn. Ther. 210(1): 49-54; 1974.* (8 references)

Monkeys were exposed to soman (7-8 μg/kg). One group received clonazepam (0.15 mg/kg) by i.v. injection at the onset of the soman-induced seizure activity and convulsions or 2 hr prior to exposure to soman. The second group followed the same procedure, but received 0.07 mg/kg of clonazepam. Cerebral electrical activity was recorded on an electroencephalograph throughout the experiment. Both doses of clonazepam completely abolished the soman-induced high voltage seizure activity and convulsions. In addition, both doses of clonazepam prevented the onset of the soman-induced abnormalities when given 2 hr prior to exposure to soman. The higher dose of clonazepam (0.15 mg/kg) appeared to increase the soman-induced respiratory depression. (Author abstract by permission)

75-0626. Andersen, R. A.; Barstad, J. A. B. (Dep. Environ. Toxicol., Nat. Inst. Pub. Health, Oslo, Norway). **Passage of tertiary and quaternary nitrogen compounds through the rat placenta.** *Arch. Int. Pharmacodyn. Ther. 210(2): 232-240; 1974.* (14 references)

Penetration of the placenta-barrier (PB) by quaternary and tertiary nitrogen compounds was studied in rats. The compounds used were either inhibitors or reactivators of acetylcholinesterase (AChE). The activity of this enzyme in fetal and maternal erythrocytes after administration of the compounds to pregnant rats was used as an indicator of PB penetration. A quaternary phosphorylated oxime was found hardly to penetrate the PB, whereas three quaternary AChE reactivators employed showed a significant, although modest, penetrating power without any marked mutual differences between mono- and bisquaternaries. Tertiary compounds, AChE inhibitors as well as reactivators, were found to penetrate the PB rather easily. (Author abstract by permission)

75-0627. Kohli, J. D.; Khanna, R. N.; Gupta, B. N.; Dhar, M. M.; Tandon, J. S.; Sircar, K. P. (Ind. Toxicol. Res. Cent., P.O. Box 80, Lucknow, India). **Absorption and excretion of 2,4,5-trichlorophenoxy acetic acid in man.** *Arch. Int. Pharmacodyn. Ther. 210(2): 250-255; 1974.* (9 references)

Absorption and excretion of 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) by man following oral administration of 2, 3, and 5 mg/kg has been studied. The compound is absorbed readily from the gastrointestinal tract and is excreted mainly via the kidneys without undergoing any metabolic alteration in the system. Applying first order kinetics the $t1/2$ of clearance of 2,4,5-T from plasma after oral administration of 5 mg/kg is 18.8 ± 3.1 hr. (Author abstract by permission)

75-0628. Doherty, J. D.; Matsumura, F. (Dept. Entomol., Univ. Wisconsin, Madison, WI 53706). **A highly ion-sensitive ATP-phosphorylation system in lobster nerve.** *Biochem. Biophys. Res. Comm. 57(4): 987-992; 1974.* (12 references)

The transfer of phosphate from ^{32}P labeled adenosine-triphospate (ATP) at low concentrations (10^{-10} to 10^{-7}M) into the peripheral nerve of the lobster was found to be highly sensitive to external ionic environments. The phosphorylation process is inhibited at conditions similar to extracellular environments (high Na^+, Ca^{++} and pH) and stimulated by those close to intracellular medium (high K^+, Mg^{++} and low pH). This system is not related to Na-K ATPase (pump ATPase) which is highly sensitive to ouabain and is active only at higher ATP concentrations ($> 10^{-6}M$). The system is membrane bound and sensitive to a variety of neuro-active agents which are known to interfere with ionic conductance changes in axons. (Author abstract by permission)

75-0629. Heenan, M. P.; Smith, J. N. (Chem. Div., D.S.I.R., Lower Hutt, New Zealand). **Water-soluble metabolites of *p*-nitrophenol and 1-naphthyl *N*-methylcarbamate in flies and grass grubs: formation of glucose phosphate and phosphate conjugates.** *Biochem. J. 144(2): 303-310; 1974.* (30 references)

Houseflies (*Musca domestica*), blowflies (*Lucilia sericata*), and grass grubs (*Costelytra zealandica*) were dosed orally with 1-naphthol or *p*-nitrophenol in milk, or were dosed topically with 0.5 μg of (^{3}H)carbaryl in acetone. Metabolites isolated from houseflies dosed with 1-napthol or *p*-nitrophenol were identified as the phosphate and glucose phosphate conjugates of these phenols by titration, hydrolysis, ionophoresis, i.r. spectra, and mixed melting point. (^{3}H)carbaryl was metabolized by houseflies, blowflies, and grass grubs to water-soluble metabolites which were chromatographically and ionophoretically similar to those of the conjugates of 1-naphthol with glucose, sulfate, phosphate, and glucose 6-phosphate.

75-0630. Chippendale, T. J.; Cotman, C. W.; Kozar, M. D.; Lynch, G. S. (Dept. Psychobiol., Univ. California, Irvine, CA 92664). **Analysis of acetylcholinesterase synthesis and transport in the rat hippocampus: recovery of acetylcholinesterase activity in the septum and hippocampus after administration of diisopropylfluorophosphate.** *Brain Res. 81(3): 485-496; 1974.* (35 references)

Twenty-four adult male Sprague-Dawley rats were given a single i.m. dose of diisopropylfluorophosphate (DFP, 1 mg/kg in arachis oil); they were sacrificed 1, 4, 24, 48, 72, 96, 168, 360, or 720 hours later. Six control animals injected with the vehicle only were sacrificed after 1 or 24 hours. Histochemical and biochemical techniques were used to study time-dependent changes in the acetylcholinesterase (AChE) activity of the medial septal nucleus and the hippocampus. In both the septum and hippocampus, an initially rapid phase of recovery was followed by a slower recovery, with similar rate constants for the two regions. Analysis of AChE synthesis in the septo-hippocampal system indicated that the recovery of activity in the septum (half-time for recovery = 140 hours) preceded that in the hippocampus (half-time for recovery = 400 hours). The data suggests that the bulk of septal AChE in the hippocampus is transported via the slow component of axoplasmic flow (about 2 mm/day).

75-0631. Hladka, A.; Krampl, V.; Kovac, J. (Inst. Ind. Hyg. and Occup. Med., Bratislava, Czechoslovakia). **Effect of malathion on the content of fenitrothion and fenitrooxone in the rat.** *Bull. Environ. Contam. Toxicol. 12(1): 33-45; 1974.* (12 references)

Changes in the contents of two organophosphorus pesticides of low toxicity, fenitrothion and malathion, and their toxic metabolites were studied in the tissues of female Wistar rats after individual or simultaneous administration. Two groups of rats received single doses of 200 mg/kg of fenitrothion or malathion. The third group of rats received a single dose of fenitrothion combined with malathion, 200 mg/kg each. The level of fenitrothion in the liver decreased in the presence of malathion. An exponential decrease of fenitrooxon level after fenitrothion administration was found in all cases. A statistically significant increase of fenitrooxon level occurred after the administration of the mixture of fenitrothion and malathion, suggesting a prolonged persistence of oxidative metabolite in the tissues, particularly muscle tissue. Malathion was found in the tissues until 30 min after administration. The differences in malathion levels in the liver and muscles following the individual and combined administration were statistically significant. No malaoxon was detected. The data does not suggest any potentiation of the toxicity of fenitrothion and malathion although the increase of fenitrooxon levels in the tissues makes such an explanation possible.

75-0632. Voight, R. A.; Lynch, D. L. (Dept. Biol. Sci., Northern Illinois Univ., DeKalb, IL 60115). **Effect of 2,4-D and DMSO on procaryotic and eucaryotic cells.** *Bull. Environ. Contam. Toxicol. 12(4): 400-405; 1974.* (16 references)

Working cultures of *Coelastrum microporum* Naeg., *Bracteacoccus cinnabarinus, Anacystis nidulans*, and *Serratia marcescens* were inoculated with sterile culture medium containing 5-100 ppm 2,4-D with or without increasing percentages of DMSO. The growth of *C. microporus* was inhibited as a function of increasing concentrations of 2,4-D, a total inhibition of growth occurring between 55 and 65 ppm. The cultures grown in 2,4-D also exhibited a large degree of clumping (not observed in controls) and changes in coloration. At 2,4-D concentrations up to 40 ppm, *Bracteacoccus* showed changes in pigmentation; at 50-70 ppm, growth was considerably reduced. Similar results were obtained with *Anacystis*, which was completely growth-inhibited at herbicide concentrations above 100 ppm. *Serratia* was much more tolerant than the algae to 2,4-D, the upper tolerance for this organism being around 850 ppm; pigment production was greatly inhibited by high concentrations of 2,4-D. DMSO was a potent growth inhibitor of *Coelastrum* and *Bracteacoccus*, the toxic effects of 2,4-D and DMSO combined being slightly greater than either compound alone. DMSO had little inhibiting effect on *Anacystis* or *Serratia* except at high concentrations. None of the microorganisms took up significant quantities of ring-labeled 2,4-D. Thus, the photosynthetic organisms were more sensitive than the heterotrophic populations to 2,4-D.

75-0633. Greichus, Y. A.; Greichus, A. (Exp. Sta. Biochem., South Dakota State Univ., Brookings, SD 57006). **Dieldrin—^{14}C residues on feathers of birds with surgically removed uropygial glands.** *Bull. Environ. Contam. Toxicol. 12(4): 413-416; 1974.* (7 references)

^{14}C-labeled dieldrin (6.19 μc) was administered i.m. to two normal adult white leghorn chickens, three normal adult mallard ducks, three chickens with surgically removed uropygial glands, and three ducks with surgically removed uropygial glands. Two young double-breasted cormorants with and two without uropygial glands were fed an entire fish which had been injected with 10.36 μc dieldrin-1^{14}C. Birds of all three species with intact uropygial glands had an average of 3.2, 6.1, and 1.7 times more radioactivity per gram, respectively, on their feathers than those without uropygial glands. However, birds with no uropygial glands had considerably more radioactivity on their feathers than vehicle-injected controls. In the chickens and ducks, the area around the uropygial gland had more radioactivity whether or not the gland was present. The greatest amount of radioactivity was found on the head feathers of the cormorants regardless of whether or not the uropygial gland was present. In these species dieldrin-^{14}C is apparently distributed onto the feathers other than by way of the uropygial gland. Dieldrin-laden lipids could have been secreted onto the feathers by way of lipoid bodies in the epidermis.

75-0634. Abo-Khatwa, N.; Hollingworth, R. M. (Dept. Entomol., Purdue Univ., West Lafayette, IN 47907). **Pesticidal chemicals affecting some energy-linked func-**

tions of rat liver mitochondria in vitro. *Bull. Environ. Contam. Toxicol. 12(4): 446-454; 1974.* (36 references)

The effects of 47 pesticidal chemicals (most of analytical grade) on four energy-linked mitochondrial (from rat liver) functions were studied. With the exception of dicofol, which acted as an uncoupling agent of respiratory chain phosphorylation, all chlorinated hydrocarbons tested inhibited oxygen uptake of both state 3 and state 4 respiration, but only at relatively high concentrations ($10^{-4}M$). Dieldrin was 10-fold more potent, causing a significant decrease in respiratory control. Half of the 14 organophosphates had no significant effect on energy-linked mitochondrial function, even at $10^{-3}M$. The polychlorinated organophosphates and diazinon inhibited state 3 respiration and respiratory control, while malathion, Zytron, and methidathion acted as uncouplers of respiratory chain phosphorylation. The phenolic hydrolysis products of iodofenphos-ethyl, chlorpyrifos, Dowco 214, and parathion were also active uncouplers of respiratory chain phosphorylation. Aldicarb and carbaryl had no significant effect on mitochondrial energy-linked functions, although dihydroxynaphthalene, a photodegradative product of carbaryl, was a potent inhibitor of mitochondrial enzymes. Linuron, propanil, diuron, silvex, 2,4,5-T, and 2,4-D stimulated state 4 respiration, had no effect on state 3 respiration, and exhibited uncoupling activity. At $10^{-6}M$, chlordimeform and U-36,059 showed uncoupling activity. At $10^{-4}M$, U-36,059, but not chlordimeform, significantly inhibited mitochondrial respiration. Binapacryl was an extremely potent uncoupler, and Banamite and MON-0858 were among the most potent uncouplers tested. Morestan also exhibited uncoupling activity at 10^{-5} M. Fentin acetate was a potent inhibitor of energy-linked mitochondrial functions, and dodine, piperonyl butoxide, trifluralin, and tetradifon had inhibitory effects at 10^{-4} to $10^{-3}M$.

75-0635. Roales, R. R.; Perlmutter, A. (Lab. Aquatic Biol., Grad. Sch. Arts Sci., New York Univ., New York, NY 10003). **Toxicity of zinc and Cygon, applied singly and jointly, to zebrafish embryos.** *Bull. Environ. Contam. Toxicol. 12(4): 475-480; 1974.* (29 references)

Eighty late blastula and early gastrula stage zebrafish (*Brachydanio rerio*) embryos were exposed for 72 hr to varying percentages of the 72 hr median tolerance limit dosages of zinc and Cygon (dimethoate). The data indicates that the embryos were more resistant to Cygon than to zinc. When the two contaminants were combined, low doses of zinc (20% of the 72 hr median tolerance limit) were antagonistic to the toxicity of Cygon; at other concentration combinations, the two toxicants appeared to have an additive effect.

75-0636. Tomlin, A. D.; Gore, F. L. (Res. Inst., Canada Dept. Agr., London, Ontario, Canada). **Effects of six insecticides and a fungicide on the numbers and biomass of earthworms in pasture.** *Bull. Environ. Contam. Toxicol. 12(4): 487-492; 1974.* (11 references)

Trefoil pasture in London, Canada was sprayed with AC92100, benomyl, WL 24073, carbofuran, methomyl, leptophos, or phorate at a rate of 3.4 kg AI/ha. Prior to and 21 days after pesticide treatment, the numbers and biomass of the following earthworms were determined: *Allolobophora caliginosa, Lumbricus terrestris*, and *Allolobophora chlorotica*. Only DDT and its analogues were present in the soil in measurable amounts prior to pesticide treatment. Population reductions due to pesticide treatment varied from 9.5% for leptophos to 94.6% for benomyl; reductions in the earthworm biomass ranged from 14.1% for methomyl to 95.9% for AC92100. Population reduction was generally correlated with biomass reduction. The most toxic pesticides were AC 92100 and phorate, followed by WL 24073, carbofuran F, leptophos, and methomyl. Benomyl and carbofuran G were also highly toxic to earthworms at the treatment rates used. Where alternative materials are available, the use of carbofuran, phorate, AC 92100, and benomyl should be avoided in orchards, pastures, vineyards and other situations where earthworms are an important component in soil fertility.

75-0637. Dorough, H. W. (Univ. Kentucky, Lexington, KY 40506). **Metabolism of methazole in wheat and onions.** *Bull. Environ. Contam. Toxicol. 12(4): 493-500; 1974.* (4 references)

Wheat plants (Arthur variety) and Bermuda onions were placed in 10 ml water containing 10^6 dpm radioactive methazole or methazole-methylurea for 24 hours. Residues extracted from the plant solids were analyzed using thin layer chromatography and radioassay. The methanol extracts of plants treated with methazolephenyl-^{14}C contained up to seven radioactive components: salts of the methylurea and urea derivatives of methazole, methazole-urea, methazole-methylurea, methazole, and, possibly, 6,7-dichloro-1-methyl-2-benzimidazolinone and its 5,6-dichloro analogue. The metabolic pathways of methazole in the two plant species were qualitatively the same, but there were major quantitative differences. Acid treatment of the plant solids released an additional 5-6% of the applied dose, the increase being primarily attributable to methazole-methylurea (wheat). Total recovery of absorbed radioactivity ranged from 81-90% in the wheat and from 96-98% in the onions. Treatment of wheat seedlings with methazole-3-^{14}C gave the same series of metabolites in similar concentrations. Methazole-5-^{14}C treatment resulted in very low levels of radioactivite metabolites in wheat. The fate of methazole-methylurea in both wheat and onions was the same as that of methazole. Methoxymethylurea-^{14}C was detected in methanol extracts of both wheat and onions.

75-0638. Mehrle, P. M.; Johnson, W. W.; Mayer, F. L., Jr. (Fish-Pesticide Res. Lab., Bureau Sport Fish. Wildl.,

Columbia, MO 65201). **Nutritional effects of chlordane toxicity in rainbow trout.** *Bull. Environ. Contam. Toxicol. 12(5): 513-517; 1974.* (10 references)

Rainbow trout were fed commercial Oregon Moist, Glencoe, Silver Cup, and Ewos diets or synthetic diets containing 23% or 45% protein. After 42 days, the fish were exposed to technical grade chlordane; the tests were conducted in glass jars containing reconstituted water. LC50s (96-hr) for chlordane were 8.2, 9.1, 20, 31, 29, and 47 μg/l for the fish fed the Oregon Moist, Glencoe, Silver Cup, Ewos, 23%-protein synthetic, and 45%-protein synthetic diets, respectively. The LC50 for the fish fed the 45% protein diet was significantly higher than that for the fish fed the other diets, and the LC50 for the fish fed the 23% protein diet was significantly lower than that for the fish fed the commercial diets. The type of diet fed prior to toxicity testing in fishes can significantly affect the results.

75-0639. Medley, J. G.; Younger, R. L.; Thomas, R. F. (USDA, APHIS, Plant Protection Quarantine Programs, S. Methods Lab., Gulfport, MS 39501). **Residues in fat of steers sprayed with a dieldrin-contaminated fly control product.** *Bull. Environ. Contam. Toxicol. 12(5): 567-569; 1974.* (4 references)

Eight Hereford steers were maintained in newly constructed pens and fed a complete ration containing no pesticide residues. The cattle were sprayed with a solution containing approximately 50% malathion and contaminated with 1, 5, or 10 ppm dieldrin. This was applied as directed every 3 weeks for horn fly control. Steers sprayed 6, 7, and 8 times during the season with the contaminated spray accumulated dieldrin in the fat but not the meat. Although the residues in the fat were low, if sprayed animals were also given feed or water contaminated with dieldrin, a contaminated spray concentrate would add to the dieldrin intake.

75-0640. St. John, L. E, Jr.; Lisk, D. J. (Pesticide Residue Lab., Dept. Food Sci., New York State Coll. Agr., Cornell Univ., Ithaca, NY 14850). **Feeding studies with Supracide in the dairy cow.** *Bull. Environ. Contam. Toxicol. 12(5): 594-598; 1974.* (12 references)

A Holstein cow weighing 477 kg and with a daily milk production of 14.2 kg was catheterized and fed 5 ppm Supracide (methidathion) for 4 days. The Supracide residues in the milk, feces, and urine and the hydrolytic phosphorus metabolites in the urine were analyzed using electron affinity gas chromatography. Unchanged Supracide was not found in the milk, urine, or feces. The compound remained stable after 24 hours incubation in rumen fluid, but after 30 minutes incubation with beef liver 10,000 X *g* supernatant fraction, degradation of the insecticide in three replicated samples was 82, 86, and 74%. Dimethyl dithiophosphate and dimethylthiophosphate ions representing 2.74% and 3.58%, respectively, of the Supracide dose were found in the urine. Apparently Supracide can be used on forage for practical insect control without harmful residues appearing in the milk.

75-0641. Vainio, H. (Dept. Physiol., Univ. Turku, Turku, Finland). **Enhancement of hepatic microsomal drug oxidation and glucuronidation in rat by 1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)ethane (DDT).** *Chem.-Biol. Interactions 9(1): 7-14; 1974.* (32 references)

DDT (160 mg/kg) in corn oil was injected i.p. into 3-month-old male Wistar rats, which were killed 24 hours later. DDT enhanced the monooxygenase step of drug biotransformation in the liver. In particular the *O*-demethylation of *p*-nitroanisole was increased, a 5-fold increase over control values being attained in 7 days. In contrast, aryl hydrocarbon hydroxylase activity was increased only 2-fold over control values. DDT also increased the cytochrome P-450 content of the liver, this increase correlating well with that in *p*-nitroanisole *O*-demethylation. The UDP-glucuronosyltransferase activity in the liver microsomes was not enhanced by DDT treatment unless the microsomes were pretreated to reveal latent activity prior to assay. Following trypsin digestion of the microsomes, increases up to 3-fold resulted from DDT treatment. The cationic surfactant cetylpyridinium chloride was less active in revealing latent UDP-glucuronosyltransferase activity, and two other membrane perturbants (phospholipase A and the detergent digitonin) revealed no enhancement in UDP-glucuronosyltransferase as a result of DDT treatment. This data suggests that the DDT-induced enhancement in the drug metabolizing activities of liver enzymes is due primarily to an enhancement of protein synthesis.

75-0642. Ntiforo, C.; Stein, M. (Dept. Appl. Biochem. Nutrition, Univ. Nottingham, Sch. Agr., Sutton Bonington, Loughborough, England). **Organophosphorus compounds and carbamates as perilysosomal modifiers.** *Chem.-Biol. Interactions 9(1): 45-55; 1974.* (28 references)

Technical malathion (0.2 ml or 0.5 ml of a 10% w/v solution in corn oil by stomach tube or 0.2 ml i.p.) was administered to male Wistar rats, which were then fasted for 24 hours and killed. Lysosomes and lysosome-rich suspensions prepared from the livers were assayed for enzyme activity. Malathion produced no significant change in the activities of total acid phosphatase, cathepsin, or aryl sulfatase. Nor was there any appreciable effect on the enzyme activities in 10% suspensions of liver homogenates or in the unsedimentable fraction. However, malathion treatment did produce an increase in free enzyme activity when lysosome-rich suspensions were preincubated at 37°C in isotonic sucrose at pH 5 for up to 120 minutes. Pretreatment of the animals with hydrocortisone did not prevent this increase in free enzyme activity. The in vitro incubation

of lysosome-rich suspensions with malathion, malaoxon, paraoxon, EPN, carbaryl, or Boots R.D. 12473 in isotonic sucrose at pH 5 and 37°C also resulted in an increase in free enzyme activity.

75-0643. Fang, S. C.; Fallin, E. (Dept. Agr. Chem., Oregon State Univ., Corvallis, OR 97331). **Uptake and subcellular cleavage of organomercury compounds by rat liver and kidney.** *Chem.-Biol. Interactions 9(1): 57-64; 1974.* (16 references)

The uptake and transformation of phenylmercury acetate (PMA), ethylmercury chloride (EMC), and methylmercury chloride (MMC) by rat liver, kidney, and brain slices were investigated. The kidney exhibited a slightly greater enzymatic activity for the cleavage of PMA and EMC than did the liver; brain tissue showed the least activity. The average rates of C-Hg cleavage were 2.4 to 3.0 nm/g/hr for PMA and 0.9 to 1.0 nm/g/hr for EMC. No cleavage of the C-Hg bond from MMC by kidney or liver tissue was observed. The cleavage of PMA was an enzymatic process, the enzyme being located in the nuclear fraction of both liver and kidney. The apparent Michaelis content and the maximal velocity value for PMA conversion by rat liver slices were 625 μM and 19.2 nmole/g/2 hr, respectively. The PMA molecule is apparently first split at the C-Hg bond to yield benzene and mercuric ion. The cleavage of the EMC molecule appears to be more complex.

75-0644. Cappon, I. D.; Nicholls, D. M. (Dept. Biol., York Univ., Toronto, Canada). **DDT increases the aminoacyl-tRNA binding activity of liver pH 5 supernatant fraction.** *Chem.-Biol. Interactions 9(3): 155-168; 1974.* (40 references)

The incorporation of (^{14}C)phenylalanyl-tRNA into peptide was measured in cell-free preparations prepared from the livers of normal Sprague-Dawley rats and the livers of animals which had been given two consecutive daily injections of DDT (200 mg, i.p.). The DDT-treated animals were killed 72 hours after the second injection. Elongation factors 1(EF 1) and 2 (EF 2), necessary for the binding of aminoacyl-tRNA to the liver ribosomes and for the translocation of peptidyl-tRNA from the A site to the P site of the ribosomes, were present in the pH 5 supernatant fractions of the livers of both control and DDT-treated rats. These fractions were incubated with salt-washed ribosomes obtained from the control livers. The results indicated that the increased incorporation observed with the pH 5 supernatant fraction obtained from the DDT-treated rats was not attributable to decreased ribonuclease activity or to increased EF 2 activity; it was due to an increase in EF 1 activity. When EF 1 was separated from EF 2 by gel filtration chromatography, the activity of EF 1 from the DDT-treated animals was greater than that of the EF 1 from the control animals. An increased binding of (^{14}C)phenylalanyl-tRNA to the liver ribosomes was also found in the preparations from the DDT-treated rats. Thus aminoacyl-tRNA binding appears to be increased in the rat liver after DDT treatment.

75-0645. Moza, P.; Mostafa, I.; Klein, W. (Inst. Oekol. Chem., Gesellschaft fuer Strahlen- und Umweltforschung mbH, Munich, Germany). **Beitraege zur Oekologischen Chemie LXXXIX. Orientierende Versuche zum Metabolismus von gamma-pentachlorcyclohex-1-en in hoeheren Pflanzen in Hydrokultur. [Contributions to environmental chemistry, part 89. Exploratory experiments on the metabolism of gamma-pentachlorocyclohex-1-ene in higher plants in hydroponic cultures.]** *Chemosphere 3(6): 255-258; 1974.* (6 references) (German)

The metabolism of gamma-pentachlorocyclohex-1-ene in corn and pea plants grown in hydroponic cultures was studied, using a combination of gas chromatography and mass spectrometry for residue analysis. Apart from unchanged gamma-pentachlorocyclohex-1-ene, *m*-dichlorobenzene, 1,2,4-trichlorobenzene, 1,2,4,5-tetrachlorobenzene, 1,2,3,4-tetrachlorobenzene, 2,4,5-trichlorophenol, and 2,3,5-trichlorophenol were also identified in corn plants that had been exposed to gamma-pentachlorocyclohex-1-ene in water for 1 week. The rate of metabolism amounted to 24%. In pea plants exposed to this substance for 3 days, the unchanged substance, as well as metabolites such as *m*-dichlorobenzene, 1,2,4,5-tetrachlorobenzene, 2,4,5-trichlorophenol, 1,2,3-trichlorobenzene, and 2,4,6-trichlorophenol were identified. The rate of metabolism was 20%. The findings indicate that gamma-pentachlorocyclohex-1-ene constitutes an intermediate rather than a final metabolite of lindane in higher plants, as has been noted in animals.

75-0646. Bernadou, J.; Dang Quoc Quan (Lab. de Pharm. Chim., Univ. Paul-Sabatier, Toulouse, France). **Reactivation par les alpha-hydroxyimino-cetones aliphatiques des cholinesterases plasmatiques du Rat Wistar inhibees par le diisopropylfluorophosphate. [Reactivation by aliphatic alpha-hyroxyimino-ketones of plasmatic cholinesterases of the Wistar rat inhibited by diisopropylfluorophosphate.]** *C. R. Acad. Sci. Paris Ser. D 278(26): 3391-3394; 1974.* (10 references) (French)

The reactivation of the plasmatic cholinesterase inhibited by diisopropylfluorophosphate in Wistar rats by 14 different aliphatic alpha-hydroxyimino-ketones (alpha-keto-aldoximes and alpha-keto-ketoximes) with 3 to 6 carbon atoms was studied in vitro. The reactivating efficiency was found to be a function of the nature of the nucleophilic group (alpha-keto-aldoxime or alpha-keto-ketoxime) and of the structure of the hydrocarbon radical. The reactivation efficiency of the aldoximes ranged from 25 to 85% in 1 hr, while that of the ketoximes was less than 10%. Hydroxyimino-1 methyl-4 pentanone-2 was found to be the most potent reactivator.

75-0647. Sotaniemi, E. A.; Medzihradsky, F.; Eliasson, G. (Dept. Internal Med., Univ. Michigan Med. Cent., Ann Arbor, MI). **Glucaric acid as an indicator of use of enzyme-inducing drugs.** *Clin. Pharmacol. Ther. 15(4): 417-423; 1974.* (28 references)

The ability of urinary glucaric acid determinations to measure enzyme induction by drugs was investigated by correlating its excretion rate with the daily drug regimens of 100 hospitalized patients and 24 normal volunteers. The urinary excretion of glucaric acid was higher in patients than in controls. Patients treated with enzyme inducing drugs (cortisone, barbiturates, antihistamines, prednisone, phenylbutazone, and *o,p'*-DDD) excreted more glucaric acid than patients not getting them. For example, the excretion of glucaric acid increased rapidly in a 38-year-old woman with Cushing's syndrome after beginning therapy with *o,p'*-DDD. In patients on multiple-drug therapy, the effect of small doses of enzyme inducers was masked, although relatively high doses of potent inducers significantly increased glucaric acid excretion. Thus, urinary excretion of glucaric acid may be useful as an indicator of the use of certain drugs when such information is not revealed by the history.

75-0648. Meiniel, R. (Lab. Biol. Anim.,Univ. Clermont, Aubiere, France). **Action protectrice de la pralidoxime vis-a-vis des effets teratogenes du parathion sur le squelette axial de l'embryon de Caille. [Protective action of pralidoxime against the teratogenic effect of parathion on the axial skeleton in quail embryo.]** *C. R. Acad. Sci. Paris Ser. D 279(7): 603-606; 1974.* (19 references) (French)

The protective action of pralidoxime against the teratogenic effect of parathion on the axial skeleton in *Coturnix coturnix japonica* embyros was studied. Teratogenesis was incuced by immersion of the eggs in 2% parathion solution for 30 sec prior to incubation, or by intravitelline incubation of 100 μg parathion on the 5th or 10th day of the incubation. Pralidoxime was injected into the vitellum on the 1st, 3rd, or 5th day of the incubation. Regardless of the mode of administration, parathion always caused skeletal anomalies, especially reduction of the overall body length, anomaly of the curvature of the skeleton, and atrophy of the cervical region. Both single and repeated administration of pralidoxime reduced the frequency and seriousness of the malformations, and single doses even increased the survival rate of the embryos. The preliminary results suggest certain relationships between the acetylcholinesterase inhibiting and teratogenic actions of parathion.

75-0649. Amer, S. M.; Farah, O. R. (Nat. Res. Cent., Dokki, Cairo, U.A.R.). **Cytological effects of pesticides. VI. Effect of the insecticide "Rogor" on the mitosis of *Vicia faba* and *Gossypium barbadense*.** *Cytologia 39(3): 507-514; 1974.* (13 references)

The effect of the insecticide Rogor (dimethoate) on the root mitosis of *Vicia faba* and *Gossypium barbadense* was studied. Seed-soak and root treatments were used. Both pure and formulated Rogor caused a large decrease in the mitotic index of *Vicia faba* compared with that of control plants. The percentage of abnormal mitoses in beans induced by formulated Rogor was much higher than that induced by the pure substance. Recovery experiments showed that roots treated with pure Rogor recovered more rapidly than those treated with the formulated substance. Disturbed prophases, metaphases, and anaphases comprised the major anomalies in both beans and cotton, lagging chromosomes also being observed in both species. Chromosome contraction was observed only in cotton, while chromosome stickiness, chromosome fragmentation, anaphase bridges, and multipolar anaphases were observed only in *Vicia faba*.

75-0650. Galasinska-Pomykol, I.; Tarmas, J.; Stefanska-Sulik, E. (Inst. Forensic Anat., Inst. Biol. Morphol. Med. Acad., Bialystok, Poland). **Obraz morfologiczny osrodkow neurosekrecyjnych podwzgorza podczas drgawek wywolanych przy pomocy pestycydu Alvit-55. [Morphological pattern of hypothalamic neurosecretory centers during convulsive state induced by pesticide Alvit-55.]** *Endokrynol. Pol. 25(3): 193-204; 1974.* (21 references) (Polish)

Morphological changes of the hypothalamic neurosecretory centers were studied in guinea pigs during convulsions induced by a single oral 25 mg/kg dose of the pesticide Alvit-55 (LD50 46 mg/kg in rats). A morphostatistical analysis revealed a significant increase of the cell nucleus volume with the decrease of the neurosecretory material content, as well as changes in the shape of the nucleus, and in the location of both the cell nucleus and nucleolus in the paraventricular neurons during convulsions. No such changes were observed in neurons of the nucleus supraopticus and main sensory nucleus of the trigeminal nerve, nor were such changes observed in any of the three nuclei investigated in animals in which the pesticide induced no convulsions.

75-0651. Kreitzer, J. F.; Heinz, G. H. (Patuxent Wildl. Res. Cent., Bur. Sport Fish. Wildl., U.S. Dept. Interior, Laurel, MD). **The effect of sublethal dosages of five pesticides and a polychlorinated biphenyl on the avoidance response of coturnix quail chicks.** *Environ. Pollut. 6(1): 21-29; 1974.* (9 references)

Coturnix quail (*Coturnix coturnix*) chicks were given sublethal amounts of chlordane (25 ppm), dieldrin (5 ppm), endrin (2 ppm), DDT derivatives (50 ppm), Ceresan M (5 ppm), or Aroclor 1254 (200 ppm) in their feed beginning at 7 days of age and continuing for 8 days, immediately followed by a 6 day period during which they received untreated feed. Their avoidance response to a moving silhouette was measured daily for 14 days. Group avoidance response was significantly

suppressed by chlordane, dieldrin, endrin, Ceresan M, and Aroclor 1254. No effect of DDT derivatives on the birds' behavior could be detected. The behavior of the endrin-treated birds normalized after 2 days on untreated feed. The data indicates partial recovery for birds treated with dieldrin and chlordane, but no recovery for those treated with Ceresan M or Aroclor 1254. The percentage of controls responding to the silhouette dropped from an average of 84 for the first 4 days to 70 on the 6th, subsequently increasing to almost 80 at the end of the study. This apparently aberrant behavior of healthy birds is attributed to a daily decrease in the discrepancy between the moving silhouette and the birds' schema for the silhouette, followed by maturation of the central nervous system starting at 14 days of age. The maturation process allowed activation of hypotheses or interpretation of events in place of simple recognition. This ability to hypothesize acts is a heightened reaction to the stimulus. If, at a time when the avoidance response of precocial chicks to strange objects is suppressed by natural endogenous factors, the response is further suppressed by pesticides, greater than normal mortality from preditors may occur.

75-0652. Kouyoumjian, H. H.; Uglow, R. F. (Zool. Dept., Univ. Hull, Hull, England). **Some aspects of the toxicity of *p,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD to the freshwater planarian *Polycelis felina* (Tricladida).** *Environ. Pollut. 7(2): 103-109; 1974.* (13 references)

The effects of *p,p'*-DDT, *p,p'*-DDE, and *p,p'*-DDD on the freshwater Triclad, *Polycelis felina*, were studied. The 96 hour LD50s of the three chemicals were 1.05, 1.23, and 0.74 ppm, respectively. The chemicals appeared to exert their effects through the nervous system as loss of coordinated movement and retardation of the flip-over times of the treated organisms. DDT also tended to inhibit asexual fission at concentrations much lower than the observed 96 hour LC50. The carrier solvent, acetone, had no permanent effects on the gross behavior of the organisms. *P. felina* responded consistently to experimental pesticide treatment and the observed intraspecific variation in resistance to organochlorine chemicals, by animals of approximately the same size, was small. The data indicates that planaria would be useful in bioassays of toxic and hazardous chemicals.

75-0653. Hwang, S. W.; Schanker, L. S. (Dept. Pharmacol., Univ. Missouri, Kansas City, MO 64110). **Absorption of carbaryl from the lung and small intestine of the rat.** *Environ. Res. 7(2): 206-211; 1974.* (9 references)

The pulmonary and intestinal absorption of the insecticide carbaryl (0.005-0.1 m*M*) administered into the lungs or small intestine of anesthetized Charles River rats was investigated. After various periods of time the organs were removed and assayed for compound that remained. Percentage of the dose unabsorbed was plotted semilogarithmically against time, and absorption half-times were calculated from the resulting curves. Results indicate that the half-time for carbaryl absorption from the lungs was 2.6 min, 2.5 times faster than from the small intestine, 6.4 min. Absorption appeared to occur by a process of simple diffusion in that the amount of compound absorbed per unit time was directly proportional to the administered dose. If these results apply to man and other mammals, they could have important implications in environmental health and toxicology.

75-0654. David, D. (Lab. Biol. Anim., Univ. de Clermont, F-63170 Aubiere, France). **Influence du DDT sur la population germinale des gonades indifferenciees de jeunes embryons de poulet et de caille. [Effect of DDT on gonocyte population of the undifferentiated gonads of early chick and quail embryos.]** *Experientia 30(8): 920-922; 1974.* (4 references) (French)

Chicken and quail eggs were treated for 30 seconds in a 50% aqueous suspension of DDT. Gonocyte count in the two gonads was determined for chick eggs reaching Hamburger and Hamilton's 24th stage and for quail eggs reaching Zacchei's 18th stage. The mortality rate of DDT-treated embryos was 18% for chicks and 22% for quail, as compared with 4-5% for control embryos of both groups. About 90% of the treated chick and quail embryos were smaller than their control counterparts. The protogonads of treated chick embryos had an average of 415 gonadocytes as compared with 670 for controls (61%); figures for quails were 445 and 633 (70%). These represent a higher count than at a later stage of development (chicks, 37% at stage 29; quail, 43% at stage 20). Only a slight lowering of these figures was obtained by using a 5% DDT concentration. Results demonstrate that DDT acts at a very early stage of embryonic development, possibly before the gonocytes leave the germinal crescent for the protogonads.

75-0655. Cooper, P. (Author address not given). **Continuing uncertainties over 2,4,5-T.** *Food Cosmet. Toxicol. 12(3): 418-421; 1974.* (10 references)

The major question concerning 2,4,5-T has been its possible teratogenic properties. It has been demonstrated that dioxin contamination is not reponsible for such teratogenic effects. Studies showed that toxicity and teratogenicity of 2,4,5-T is greater than that of 2,4-D. The incidence of fetal malformations is directly related to the dose level in animals given 2,4,5-T contaminated with dioxin. Contamination with dioxin increased the levels of embryonic mortality and hemorrhage associated with 2,4,5-T doses of 40 mg/kg or more. Commercial samples of 2,4-D and 2,4,5-T were studied in mice. Both preparations were teratogenic and embryotoxic at doses of 110 mg/kg/day given s.c. on days 6-14 of pregnancy. At a lower dose level of 50 mg/kg/day, 2,4,5-T had a greater effect than did 2,4-D. The disposi-

tion and elimination of 2,4-D and 2,4,5-T differ substantially and to some extent this explains the difference in teratogenicity of the two compounds. No difference has been noted between pregnant and nonpregnant rats in the rate of their elimination of 2,4,5-T. In vitro studies were made of the effect of these compounds on three enzymes concerned with DNA synthesis and cell division, ribonucleotide reductase, DNA polymerase, and thymidine kinase of developing rat brain. The study showed that 2,4,5-T was a potent inhibitor of ribonucleotide reductase but had no effect on the other 2 enzymes even at concentrations of 10^{-4} *M*. Dioxin also inhibited ribonucleotide reductase in vitro but to a lesser degree. The ability of 2,4,5-T to inhibit the activity of ribonucleotide reductase may offer biochemical background relevant to some of the observed effects of this herbicide.

75-0656. Bus, J. S.; Gibson, J. E. (Dept. Pharmacol., Michigan State Univ., East Lansing, MI 48824). **Bidrin: perinatal toxicity and effect on the development of brain acetylcholinesterase and choline acetyltransferase in mice.** *Food Cosmet. Toxicol. 12(3): 313-322; 1974.* (22 references)

The purpose of this study was to investigate the perinatal toxicity of Bidrin and the effect of the insecticide on the developmental patterns of brain acetylcholinesterase (AChE; EC 3.1.1.7) and choline acetyltransferase (ChAc; EC 2.3.1.6) in mice. Bidrin (1, 2, 5, and 7.5 mg/kg) was given by i.p. injection to pregnant mice during organogenesis in teratology studies, while 5 mg Bidrin/kg was given i.p. on days 8-16 of gestation in AChE and ChAc developmental studies. AChE and ChAc were determined radiometrically. Bidrin caused no morphological anomalies at any doses or times of administration. Brain AChE levels of the embryo or fetus were depressed when measured 32 min after Bidrin administration to the mother in a dose of 5 mg/kg on day 11 or day 19 of gestation, but enzyme activity was fully recovered by day 19 of gestation after Bidrin had been given daily on days 8–16 of gestation. ChAc development patterns in embryos and fetuses were not changed after single doses or repeated Bidrin administration during gestation. Bidrin was concluded to have a low potential for induction of terata in mice, even though it transiently reduced embryonic or fetal AChE activity to 1.8% of control levels following acute administration on day 11 of gestation. Furthermore, prenatal exposure to Bidrin does not alter the development of AChE or ChAc. (Author abstract by permission)

75-0657. Dekas, J. C. (U.S. Dept. Agr., Agr. Res. Serv., Metab. and Radiat. Res. Lab., Fargo, ND 58102). **Absorption of pesticidal carbamates from perfused intestinal loops in conscious swine.** *Food Cosmet. Toxicol. 12(3): 377-379; 1974.* (2 references)

Five carbamate pesticides (carbyne, zectran, baygon, mobam, and carbaryl) dissolved in isotonic saline in a concentration of 10^{-6} were perfused in sequence through an isolated intestinal loop of a miniature pig. The disappearance half-times were approximately 30 min, although the rate of absorption varied somewhat with the structure of the carbamate. The perfusion system used was constructed entirely of teflon and the results obtained reflected the true intestinal absorption of the carbamates. (Author abstract by permission)

75-0658. Todd, G. C.; Gibson, W. R.; Kehr, C. C. (Toxicol. Div., Lilly Res. Lab., Greenfield, IN 46140). **Oral toxicity of tebuthiuron (1-(5-*tert*-butyl-1,3,4-thiadiazol-2-yl)-1,3-dimethylurea) in experimental animals.** *Food Cosmet. Toxicol. 12(4): 461-470; 1974.* (15 references)

The toxicity of tebuthiuron (1-(5-*tert*-butyl-1,3,4-thiadiazol-2-yl)-1,3-dimethylurea) has been studied in several animal species. The acute oral LD50s in mice, rats, and rabbits were 579, 644, and 286 mg/kg, respectively. In cats oral doses of 200 mg/kg were not lethal, while 500 mg/kg given orally did not kill dogs, quail, ducks, or chickens. The acute TL50 in fish was > 160 ppm. A 3-month study in rats fed diets containing 0, 400, 1000, or 2500 ppm tebuthiuron resulted in moderate growth retardation and a reduction in the efficiency of food utilization in the highest dose group. These changes were evident by wk 1 of the study. In the same group, a non-inflammatory diffuse vacuolization of the pancreatic acinar cells was found. No other important evidence of toxicity occurred. A 3-month study in dogs given daily oral doses of 0, 12.5, 25, or 50 mg tebuthiuron/kg resulted in slight anorexia in all the treated dogs and a slight body-weight loss in dogs of the highest dose group. There were no other treatment-related signs of toxicity. A 1-month study in chickens fed rations containing 0, 400, 1000, or 2500 ppm tebuthiuron produced, in the highest treatment group, a reduction in food intake and suppression of body-weight gain but no other signs of toxicity. A teratology study produced no significant effects in the offspring of rats fed diets containing 0, 600, 1200, or 1800 ppm tebuthiuron. Skin and eye irritation studies in rabbits and a contact sensitization study in guinea-pigs revealed no remarkable evidence of toxicity. These studies indicate that tebuthiuron has a low order of toxicity in animals. (Author abstract by permission)

75-0659. Khera, K. S. (Food Res. Lab., Health Protect. Br., Tunney's Pasture, Ottawa, Ontario, Canada). **Teratogenicity and dominant lethal studies on hexachlorobenzene in rats.** *Food Cosmet. Toxicol. 12(4): 471-477; 1974.* (16 references)

Teratogenicity studies were carried out in rats given simple daily oral doses of 0, 10, 20, 40, 60, 80, or 120 mg hexachlorobenzene/kg during days 6-9, 10-13, 6-16, or 6-21 of gestation. The 80 and 120 mg/kg doses caused maternal neurotoxicity and a reduction in fetal

weight. In the fetuses, the incidence of uni- and bilateral 14th rib was significantly increased above control values when the fungicide was administered from days 10-13, 6-16, or 6-21 of gestation. This incidence was related to the duration of treatment and the dose. Sternal defects in the fetus were observed following dosing during 6-21 days gestation. Values for live and dead fetuses, resorption sites, fetal weight, and visceral and other skeletal anomalies were within control limits. For the dominant lethal test, four groups of 15 male rats were dosed orally with 0, 20, 40, or 60 mg/kg for ten consecutive days. Fourteen sequential mating trials, in each of which a male was caged with two virgin females for 5 days, were conducted. There were no significant differences between the test and control groups with regard to the incidence of pregnancies, corpora lutea, live implants, or deciduomas. (Author abstract by permission)

75-0660. Neuville, D.; Daste, P.; Longchamp, R. (Lab. Biol. Ostreicole et Marine, Univ. Poiters, Chateau-d'Oleron, France). **Toxicitee comparee de divers pesticides a l'egard de deux especes de Diatomees utiles a l'ostreiculture. [Comparative toxicity of various pesticides with respect to two useful *Diatoma* species in oyster cultures.]** *C. R. Acad. Sci. Paris Ser. D 279(8): 675-678; 1974.* (17 references) (French)

The toxicity of insecticides, herbicides, and fungicides in two *Diatoma* species used in oyster growing, *Phaeodactylum tricornatum* and *Navicula ostrearia*, was studied in an 8-day in vitro incubation test. The lethal doses for *N. ostrearia* were determined to be 4 ppm for lindane, 10 ppm for *O,O,O',O'*-tetramethyl-*O,O'*-dithio-*p*-phenylene thiophosphate, 50 ppm for fenitrothion, 50 ppm for methiocarb, 0.1 ppm for paraquat, 1 ppm for atrazine, 200 ppm for 2,4-D amine salt, and 1 ppm for a mixture of copper tetroxychloride with maneb and zineb. The corresponding values determined for *Ph. tricornatum* were 8 ppm, 1000 ppm, 50 ppm, 1000 ppm, 100 ppm, 2 ppm, 2000 ppm, and 10 ppm. Paraquat and atrazine were most toxic for both species. Sublethal concentrations caused structural anomalies, especially in the chromatophores, accompanied by marennine production in *N. ostrearia.*

75-0661. Claus, G.; Krisko, I.; Bolander, K. (Sch. Med., Univ. Vienna, Vienna, Austria). **Chemical carcinogens in the environment and in the human diet: can a threshold be established?** *Food Cosmet. Toxicol. 12(5/6): 737-746; 1974.* (15 references)

Construction of a dose-response curve for a given effect, an established procedure in toxicology, becomes controversial in testing for long-term effects such as carcinogenicity. It has been suggested that once a dose-response curve has been obtained for the carcinogenic potential of a chemical in the exposure range where effects are observable, the dose which should produce only one tumor in a large human population could be calculated by extrapolation. This procedure is impeded by many of the objections surrounding the process of extrapolation from animals to man. To give a concrete meaning to the figures resulting from downward extrapolation, it is necessary to consider four parameters: a supposedly known parameter for which the LD50 has been established, the number of molecules present in the TD50 dose of the compound in question, the number of cells present in the organism for which the "acceptable risk dose" is being established, and the minimum number of molecules that must be present in a cell for their presence to be registered by that cell. DDT was used as an example for downward extrapolation, with 140 ppm in food as the TD50 for mice, although the acceptance of this value is questioned. Applying the method described or other statistical approaches for estimating an acceptable risk dose yielded values far outside the reasonable range of human exposure to DDT. Exposure standards based on statistical extrapolations which fail to take account of fundamental biological concepts, such as the threshold principle, can be misleading.

75-0662. Slade, M.; Zibitt, C. H. (Zoecon Corp. Res. Lab., Palo Alto, CA 94304). **Metabolism of Cecropia juvenile hormone in insects and in mammals.** *IN: Insect Juvenile Hormones, their Chemistry and Action. Proceedings of a Symposium on Chemistry and Action of Insect Juvenile Hormones, Washington, DC, Sept. 12-17, 1971, pp. 155-176.* (13 references)

The observable activity of the hormone methyl *trans, trans,cis*-10,11-epoxy-7-ethyl-3,11-dimethyltrideca-2,6-dienoate, which inhibits metamorphosis in many orders of insects, is modified by the in vivo metabolism of the juvenile hormone of the silk moth *Hyalophora cecropia*. In vivo and in vitro studies using 2-^{14}C-labeled hormone have shown that with *Manduca sexta* (tobacco hornworm) the mechanism of inactivation involves hydrolysis of the ester group followed by hydration of the epoxide. Qualitative differences have been noted with *Hyalophora cecropia* (robin moth), *Schistocerca vaga* (vagrant grasshopper), and *Sarcophaga bullata* (flesh-fly). All of the metabolic pathways investigated and their possible relations to feedback mechanisms which control development of insects have been considered. The metabolism of Cecropia juvenile hormone by mice in vivo was studied and compared with that which occurs in insects. The limited nature of the results makes it impossible to state whether the initial sites of metabolic attack on the Cecropia juvenile hormone are the same in mice as in insects.

75-0663. Schuette, H. R.; Goehler, K. D. (Inst. Biochem. Pflanz., Forschungszentrum Molekularbiologie Medizin, Halle/Saale, DDR). **Beitraege zur Biochemie und Physiologie von Morphaktinen. 2. Mitt. Ueber Metabolismus und Rueckstandsverhalten von 9-Hydroxyfluorenyl-(9)-carbonsaeure-*n*-butylester bei *Hordeum***

vulgare. **[Contributions to the biochemistry and physiology of morphactins. Note 2: On the metabolism and residue dynamics of 9-hydroxyfluorenyl-(9)-carboxylic acid *n*-butyl ester in *Hordeum vulgare*.]** *Isotopenpraxis 10(10): 353-356; 1974.* (12 references) (German)

The metabolism and residue dynamics of ^{14}C- and/or tritium-labeled 9-hydroxyfluorenyl-(9)-carboxylic acid *n*-butyl ester were studied in *Hordeum vulgare* and in rat liver microsomal preparations. While the compound remained unchanged in the aromatic part of its molecule, splitting of its ester bond, tentatively regarded as a physiological reaction, was evidenced in *Hordeum vulgare*. Metabolism was found to take place in the alcohol part of the molecule, which was in the form of a glycoside following hydroxylation. One or more beta-D-glucopyranosides of a 9-hydroxyfluorenyl-(9)-carboxylic acid *n*-butylester derivative are believed to be among the metabolites. Metabolism occurred in the alcohol part of the molecule in rat liver microsomal preparations, but the metabolites, except for 9-hydroxyfluorenyl-(9)-carboxylic acid, were not identical with those found in the in vivo tests. Following application to young specimens of *Hordeum vulgare*, the growth regulator residue declined considerably within the first 20 days, with the bulk localized in non-extractable form. The metabolite concentration increased at the same time.

75-0664. Ferrando, R.; Fourlon, C.; Gutel, B. (Lab. Nutr. Aliment. Ecole Nat. Vet., Alfort, France). **Vitamine A et DDT. [Vitamin A and DDT.]** *Int. J. Vitam. Nutr. Res. 43(4): 504-509; 1973.* (9 references) (French)

The effect of vitamin A administration on hepatic vitamin A storage and the growth of young male Wistar rats was studied in a 45-day experiment. The animals were fed 5-50 μg/day doses of vitamin A, with and without 5-10 μg/day doses of DDT. When growing rats received DDT in their diet, the liver vitamin A storage decreased sharply, leading to depletion of vitamin A reserves. Compared to a group receiving only DDT, vitamin A reduced the mortality due to DDT. Joint administration of vitamin A and DDT enhanced growth of the animals. At doses of 25 μg/day or more vitamin A may promote enzyme induction by DDT; vitamin A is probably involved in liver enzyme induction by DDT under non-experimental conditions.

75-0665. Intrieri, C.; Ryugo, K. (Inst. Colt. Arboree, Univ. Bologna, Bologna, Italy). **Uptake, transport and metabolism of (2-chloroethyl)trimethylammonium chloride in seedlings of almond (*Prunus amygdalus*, Batsch.)** *J. Amer. Soc. Hort. Sci. 99(4): 349-352; 1974.* (15 references)

Radioactivity in almond (*Prunus amygdalus* Batsch) seedlings treated with (2-chloroethyl)-trimethylammonium chloride (chlormequat chloride, CCC, Cycocel) labeled in the 1 and 2 positions was initially translocated acropetally from the fully expanded treated leaf to younger leaves and growing point. After 2 days, basipetal movement was observed; a shoot to root gradient was established for 6 days, after which ^{14}C was randomly distributed within the plant. $^{14}CO_2$ was evolved in the greatest quantities within 2 hours after treatment. The rate diminished until the fourth day; the amount evolved between the fourth and tenth days remained relatively constant. Paper chromatography of the methanolic extracts disclosed 17 known amino acids and an unidentified ninhydrin-positive substance, plus malic and citric acids; all were radioactive. Two other radioactive bands which co-chromatographed with choline and 2-chloroethylamine were also detected in extracts of treated leaves. Based on these observations, a tentative pathway of Cycocel catabolism is proposed.

75-0666. Jepson, J. H.; McGarry, E. E. (Div. Hematol., Med. Coll. Pennsylvania, Philadelphia, PA). **Effect of the anabolic protein hormone prolactin on human erythropoiesis.** *J. Clin. Pharmacol. 5: 296-300; 1974.* (22 references)

Prolactin (600-900 μg/kg/day) was administered i.m. for 3-6 weeks to a 56-year-old diabetic female, a 61-year-old diabetic female, a 33-year-old 3-month postpartum female who had developed signs and symptoms of anemia and hemorrhage following exposure to DDT, and a 63-year-old female with pancytopenia and severe bone marrow aplasia. Two of the four patients appeared to show some erythropoietic response to the prolactin. Continuous hemorrhage, requiring transfusion of blood and platelet concentrates, made it impossible to interpret the data in the DDT-exposed patient. Even when the erythropoietin concentration in the plasma was markedly increased (5-10 μ/ml) as a result of severe anemia, ferrokinetic studies during 6 weeks of prolactin administration indicated a continued severe aplasia. The patient expired from an intracranial hemorrhage.

75-0667. Johnson, M. K. (Biochem. Mechanism Sect., M.R.C. Toxicol. Unit, Carshalton, Surrey, England). **The primary biochemical lesion leading to the delayed neurotoxic effects of some organophosphorus esters.** *J. Neurochem. 23(4): 785-789; 1974.* (18 references)

Organophosphates of the type $(RO)_2$ P.O.X are neurotoxic. Several phosphinates of general structure (R_2P.O.X) cause prolonged inhibition of "neurotoxic esterase" in vivo without causing delayed neurotoxicity even after repeated dosing. Prior administration of these phosphinates served to protect hens against the neurotoxic effects of several organophosphates. Such protection lasted until about 70% of the enzyme site again became available for phosphorylation. This aspect of phosphinate behavior is similar to carbamate and sulfonyl fluoride inhibition of "neurotoxic esterase". It is suggested that the development of delayed neurotoxicity requires phosphorylation of the esterase followed

by hydrolysis of one remaining phosphoryl ester bond to produce a charged monosubstituted phosphoric acid group attached to the protein. The generation of such a group could not occur after inhibition by protective phosphinates, carbamates, or sulfonates. This charged group may be responsible for the metabolic disturbance leading to degeneration of long axons.

75-0668. Jeffries, D. J. (The Nature Conservancy, Monks Wood Exper. Sta., Abbots Ripton, Huntingdon, England). **The effects of organochlorine insecticides and their metabolites on birds.** *J. Reprod. Fert. 19(Suppl.): 337-352; 1973.* (81 references)

The effects of organochlorine residues on reproduction in birds were studied using *p,p'*-DDE and *p,p'*-DDT. Insecticide concentrations in diet were based on dry weight amounts, with 10 ppm dry weight approximating 3 ppm wet weight in natural food. Behavioral changes took the form of increased aggression, reduced discriminatory behavior and alertness, and reduced territorial activity. DDT and DDE are also alleged to cause eggshell thinning in certain species of birds, and this is believed to be due to the effects of this insecticide on calcium metabolism. The insecticides caused increased eggshell breakage, which may have been a result of eggshell thinning as well as behavior changes. An increase in infertility was noted when certain male birds were fed DDT. This may have been due ultimately to some change in thyroid activity. Hatchability was reduced in certain species of birds, possibly because of the presence of residues in yolk or some disruption of mitosis. An increase in post hatching mortality may result from the rise in amount of organochlorine residues in the blood of the chick as it absorbs insecticide residues from the yolk. Egg yolk size may be smaller in DDE and DDT dosed birds than in controls. The effect of the organochlorine residues is believed to be exerted via the endocrine system. There may be increased induction of hepatic enzyme systems and a concomitant rise in metabolism of progesterone, testosterone, and estrogen. DDT may also have some estrogenic effects, due to the similarity of the DDT molecule to diethylstilbestrol. DDT caused symptoms similiar to hyperthyroidism in certain birds fed sublethal doses of the insecticide, and hypothyroidism in others. The adverse effect of organochlorine residues on calcium metabolism may be able to override the stimulatory effects of estradiol on bone deposition, thus causing a reduction in the amount of calcium in bone of certain birds. There may also be some effect on the carbonic anhydrase system in the shell gland.

75-0669. Hollwich, F.; Dieckhues, B. (Augenklinik, Westfaelische Wilhelms-Univ., Muenster, Germany). **Augenlicht und Leberstoffwechsel. [Ocular light perception and metabolic activity of the liver.]** *Klin. Monatsbl. Augenheilk. 264(Suppl.): 449-452; 1974.* (17 references) (German)

The effect of the light stimulation of the eye on the metabolic activity of the liver was studied in albino mice kept in light or in darkness and in subjects with normal vision and blind persons. Following nembutal injection, the mortality rate was significantly lower in mice kept under normal conditions than in those kept in darkness, indicating a reduced metabolic and detoxifying capacity of the liver in the absence of light stimulation. Following E 605 (nitrostigmine, parathion) injection, mortality was higher in the group kept under normal conditions, reflecting the reduced rate of metabolism of this compound into the more toxic mintacol (paraoxon) in the liver of animals kept in darkness. The serum bilirubin levels were significantly and substantially higher in blind persons than in normal subjects exposed to normal light stimulation through the eyes. The stimulating action of light on the metabolic and synthesizing function of the liver is due to the stimulation of pituitary hormones, with ACTH stimulating cortisol production in the adrenal cortex. Cortisol stimulates the synthesizing and detoxifying function of the liver.

75-0670. Matschiner, J. T.; Willingham, A. K. (Dept. Biochem., Univ. Nebraska Coll. Med., Omaha, NB 68105). **Influence of sex hormones on vitamin K deficiency and epoxidation of vitamin K in the rat.** *J. Nutr. 104: 660-665; 1974.* (14 references)

The effect of sex hormones on vitamin K deficiency was studied in intact and castrated male and female Sprague-Dawley derived rats. The onset of vitamin K deficiency after castration was enhanced in the females and retarded in the males. Castrated rats of both sexes developed vitamin K deficiency to about the same extent. Plasma prothrombin levels in castrated males and females fed vitamin K-deficiency diets dropped after the injection of testosterone and rose or remained high after the injection of estradiol. Castration did not prevent hyperprothrombinemia in adult female rats fed adequate amounts of vitamin K. Phenobarbital, methyl cholanthrene, and DDT also appeared to enhance the onset of vitamin K deficiency in castrated male rats. The activity of phylloquinone epoxidase in the liver microsomes varied with the degree of vitamin K deficiency, the activity of the enzyme being highest when the prothrombin levels in the plasma were lowest. Phenobarbital, methyl cholanthrene, and DDT resulted in changes in epoxidase activity similar to those seen after testosterone administration.

75-0671. Thongsinthusak, T.; Krieger, R. I. (Dept. Environ. Toxicol., Univ. of California, Davis, CA 95616). **Inhibitory and inductive effects of piperonyl butoxide on dihydroisodrin hydroxylation in vivo and in vitro in black cutworm (*Agrotis ypsilon*) larvae.** *Life Sci. 14(11): 2131-2141; 1974.* (17 references)

Biphasic inhibition and stimulation of microsomal oxidase activity in tissue homogenates in vitro and of

dihydroisodrin (DHI) hydroxylation in vivo in black cutworm *Agrotis ypsilon* larvae have been produced by pretreating larvae with piperonyl butoxide (PB). Gut homogenate had greatest DHI hydroxylase activity of tissues tested and PB molar I50 was $6.4 \times 10^{-5} M$. Two hours after topical application of PB (1.4 mg/larva) DHI hydroxylase was reduced 39, 30, 19, and 48% in fat body, gut, head and Malpighian tubule homogenates, and after 15 hours activity was increased 145, 69, 28, and 97% in the respective homogenates. The effects are time- and dose-dependent. In vivo three hours after PB administration, the rate of DHI hydroxylation was reduced 26%, but 15 hours after pretreatment the rate was increased 25%. (Author abstract by permission)

75-0672. Chhabra, R. S.; Tredger, J. M.; Philpot, R. M.; Fouts, J. R. (Pharmacol. Br., Nat. Inst. Environ. Health Sci., Research Triangle Park, NC 27709). **Selection of inducers: an important factor in characterizing genetic differences in induction of aryl hydrocarbon hydroxylase in strains of mice.** *Life Sci. 15(1): 123-130; 1974.* (15 references)

The effect of various microsomal enzyme inducers such as DDT, benzpyrene, 3-MC, TCDD (dioxin) or phenobarbital on liver microsomal mixed-function oxidases and cytochrome P450 content in mice genetically responsive (C57B1/6J) and resistant (DBA/2J) to induction of aryl hydrocarbon hydroxylase (AHH) was studied. 3-MC and benzpyrene administration stimulated liver AHH activity 6-8 fold in C57B1/6J mice but had no effect in DBA/2J mice. However, intraperitoneal administration of TCDD increased AHH activity in both C57BL/6J and DBA/2J mice. This increase was accompanied by shift in the peak of cytochrome P450 difference spectrum from 450 to 448 nm. It is concluded that genetic resistance to AHH stimulation in DBA/2J mice is influenced by the type of inducer used. (Author abstract by permission)

75-0673. Kouri, R. E.; Ratrie, H., III; Atlas, S. A.; Niwa, A.; Nebert, D. W. (Dep. Viral-Chem. Oncol., Microbiol. Associates Inc., Bethesda, MD 20014). **Aryl hydrocarbon hydroxylase induction in human lymphocyte cultures by 2,3,7,8-tetrachlorodibenzo-*p*-dioxin.** *Life Sci. 15(9): 1585-1595; 1974.* (27 references)

Aryl hydrocarbon (benzo[a]pyrene) hydroxylase activity is induced in cultured human lymphocytes by 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) at a concentration in the growth medium 40 to 60 times less than the concentration of 3-methylcholanthrene (MC) necessary for maximal hydroxylase induction. In cultured lymphocytes from 19 individuals, the extent of hydroxylase induction by TCDD or MC ranged between 1.7- and 2.9-fold. Those individuals having (presumably under genetic control) lower basal and MC-inducible hydroxylase activities in their lymphocytes also have lower TCDD-inducible hydroxylase activity. Because of the day-to-day experimental variability, the variations within each assay, and for several other reasons discussed, it is suggested that the observed variance of expression of hydroxylase induction more closely fits a unimodal, polygenic (i.e. 2 or more genes) pattern rather than the trimodal (single gene) form of inheritance proposed recently by Kellermann and coworkers. (Author abstract by permission)

75-0674. Unsworth, B.; Hennen, S.; Krishnakumaran, A.; Ting, P.; Hoffman, N. (Dept. Biol., Marquette Univ., Milwaukee, WI 53233). **Teratogenic evaluation of terpenoid derivatives.** *Life Sci. 15(9): 1649-1655; 1974.* (12 references)

Eight terpenoid derivatives with juvenile hormone activity were tested for teratogenicity. Three of the derivatives were teratogenic when administered to mice as a single intraperitoneal injection of 1 mg/g on either day 9 or day 10 of pregnancy. However, intubation [*sic*] at 5 mg/g of the two most teratogenic derivatives resulted in one of the derivatives marginally increasing the incidence of abnormal embryos above peanut oil-intubated controls; the other intubated derivative was without adverse effect. Of the remaining five compounds, two with high juvenile hormone activity were without teratogenic effect when injected at 1 mg/kg. Since teratogenic effects were observed only at a dose above likely exposure levels and by a route of administration not possible in the environment, support is provided for the potential use of terpenoid derivatives in the control of insect pests. (Author abstract by permission)

75-0675. Balintne Ambro, I. (Res. Inst. Chem. Ind., Veszprem, Hungary). **Tracerindikacios vizsgalatok a (6-^{14}C)Vitavax fungicid metabolizmusanak tanulmanyozasara. [Tracer studies on the metabolism of (6-^{14}C) Vitavax fungicide.]** *Magy. Kem. Lapja 29(8): 393-401; 1974.* (46 references) (Hungarian)

The uptake, translocation, and metabolism of ^{14}C-labeled Vitavax fungicide (carboxin, 5,6-dihydro-2-methyl-1,4-oxathiine-3-carboxanilide) were studied in *Phaseolus vulgaris* following dry seed dressing, steeping, and root treatment. A combined thin-layer chromatographic and autoradiographic investigation revealed 77.5% of the acetone extractable radioactivity in leaves, 4.7% in the stalk, and 17.7% in the roots following steeping of bean seeds. Following root treatment in nutrient solution, the amounts of vitavax present in the leaves, stalks, and roots were 95%, 3%, and 2% respectively on the seventh day of the treatment. The compound was translocated to the leaves in the form of the water-soluble sulfoxide metabolite of the practically insoluble fungicide. Metabolic studies revealed intact vitavax, its sulfoxide, and possibly a hydrolysis product of the latter in bean leaves.

75-0676. Rose, M. S.; Smith, L. L.; Wyatt, I. (Biochem. Mechanisms Unit, Imperial Chem. Ind. Ltd., Central Toxicol. Lab., Alderley Park, Cheshire, England). **Evidence for energy-dependent accumulation of paraquat into rat lung.** *Nature (London) 252(5481): 314-315; 1974.* (11 references)

Lung slices from male Alderley Park specific pathogen free rats were incubated with 0.1 μCi of methyl-^{14}C-paraquat or ethylene-^{14}C-diquat. The amount of radioactivity in the tissues was measured using a liquid scintillation spectrometer. The amount of diquat found in lung slices incubated in media containing 10^{-5} to 10^{-3} *M* diquat remained constant over incubation times of 30 minutes to 2 hours, the plateau value obtained being dependent on the pesticide concentration. In contrast, paraquat was accumulated linearly from 30 minutes to 2 hours and the amounts of paraquat accumulated were greater than the amounts of diquat accumulated. Paraquat accumulation was inhibited when KCN (10^{-3} *M*) and iodoacetate (10^{-3} *M*) were added to the incubation medium; paraquat accumulation was also inhibited by rotenone (10^{-5} *M*). Thus, the accumulation of paraquat into rat lung slices in amounts in excess of those seen with diquat was energy-dependent. The apparent *Km* for the process was 7×10^{-5} *M* and the *V*max was 300 nmole paraquat/g wet weight/hour. After the administration of paraquat (126 mg/kg) to rats, the lung concentration rose from 5 μg/g at 4 hours to 14 μg/g at 32 hours; the plasma concentration remained constant at around 1 μg/ml. The blood paraquat was probably derived from the gastrointestinal tract. The rat lung accumulated no diquat in vivo. After ingestion of paraquat by humans, the herbicide must be removed from the entire gastrointestinal tract and blood.

75-0677. Dross, K. (Vogt Inst. Hirnforsch., Univ. Dusseldorf, 4000 Dusseldorf, Germany). **The effect of DFP on phosphatidylcholine-metabolism in rat-brain.** *Naunyn-Schmiedeberg's Arch. Pharmacol. 282: R16; 1974.*

DFP decreases rat-brain content of glycerylphosphorylcholine which points to an alteration of phosphatidylcholine (PACh)-metabolism. Female Wistars received 2.0 mg DFP per kg s.c. 30, 60, 120, and 240 min. prior to sacrifice. The effects on PACh and lyso-PACh were antagonistic. While PACh-concentration increases slightly (115% of controls) within an hour, there is a continuous decrease in lyso-PACh, reaching 2/3 of controls two hours after DFP. This finding strongly indicates a diminution of PACh degradation, which is supported by the inhibition of rat-brain phospholipase A by DFP found in vitro. With respect to the demyelinations caused by DFP and other organophosphorus compounds, this inhibition of PACh-breakdown is the earliest event. Disturbances of phospholipid and lipid metabolism in nerve-tissue seen after demyelinating organophosphorus agents are probably consequences of phospholipase A inhibition. This inhibition has to be discussed as a first step, which induces demyelinization caused by organophosphorus drugs. (Author abstract by permission, abridged)

75-0678. Frohberg, H. (Inst. Toxikol., E. Merck, D 61 Darmstadt, Germany). **Investigations on the embryotoxic effect of 2,4,5-T in NMRI-mice.** *Naunyn-Schmiedeberg's Arch. Pharmacol. 282: R22; 1974.*

The herbicide 2,4,5-T was given as free acid = (A) (dioxin content < 0.1 ppm) in arachis oil and as butoxyethylester (Hormoslyr 500 T) = (E) to NMRI-EMD-SPF mice from the 6th-15th day p.c. in oral doses of 0, 20, 40, 80, and 120 mg/kg/day. Other mice were exposed to inhalable aerosol generated from diluted E in concentrations of 0, 85, 216, and 374 mg/m^3 for 5 hours a day from the 6th-15th day p.c. In other experiments mice were exposed to concentrations of 392 mg/m^3 and 406 mg/m^3 respectively from day 6-10 p.c. and 11-15 p.c. Doses and concentrations are expressed as free acid. After 10 oral applications of 80 and 120 mg/kg (toxic for mother animals) malformations (7.9 and 22.3% respectively) and fetal loss (FL) (13.5 and 51.5% respectively) were observed. E had an influence on fetal development only in the highest dose. The rate of malformation (MR) was 11.6% and that of FL 11.6%. In the inhalation experiments with 216 mg/m^3 E showed a slight maternal toxic, fetotoxic (F—11.6%) and teratogenic (MR-22.2%) effect. After 10 exposures to 374 mg/m^3 5 of 15 mother animals died. Exposures to 392 mg E/m^3 (day 6-10 p.c.) and to 406 mg E/m^3 (day 11-15 p.c.) were toxic for adults and fetolethal (FL 58.5% and 28.1% respectively). After inhalation from day 11-15 p.c. the MR was 30.9%. Assuming an absorption rate of 80% the 5 hr exposure to 216 mg/m^3 corresponds to an inhaled dose of 37 mg/kg. These results do not substantiate a special risk to the human embryo from regular use of 2,4,5-T. (Author abstract by permission)

75-0679. Nenner, M. (Inst. Pharmakol., D 34 Goettingen, Germany). **Aging of erythrocyte-bound acetylcholinesterase after phosphorylation by PO-derivatives of organophosphorus insecticides.** *Naunyn-Schmiedeberg's Arch. Pharmacol. 282: R70; 1974.*

Undiluted bovine blood (pH 7.4 and 37°C) was used to investigate inhibition, aging, and reactivation of acetylcholinesterase (ACHE, EC 3.1.1.7) under conditions which are very similar to the intact biological system. Advantages of this in vitro model: the enzyme ACHE occurs in its biological state, bound to the stroma of the erythrocyte. All plasma enzymes are present with their full activity. Binding of the organophosphates to plasma proteins is in good agreement with conditions in the animal experiment. Organophosphorus compounds investigated: paraoxon, PO-demeton, methyl paraoxon, PO-dimethoate, and trichlorfon. Results: aging of

erythrocyte-bound ACHE appears faster than the aging of an ACHE solution prepared from a lyophilized ACHE preparation. The aging of the dimethylphosphorylenzyme is at least five times faster than aging of the diethylphosphorylenzyme. (Author abstract by permission)

75-0680. Niedner, R.; Oettingen, U. von; Meyer, F. (Inst. Pharmakol. Toxikol., Tech. Univ. Carolo-Wilhelmina, 33 Braunschweig, Germany). **Binding of warfarin on the serum proteins of mice and rats.** *Naunyn-Schmiedeberg's Arch. Pharmacol. 282: R70; 1974.*

Warfarin (3-(α-acetonyl benzyl)-4-hydroxy-coumarin) has a marked effect on rats, but only a small one on mice. Previous studies showed an essentially smaller sensitivity of mice against this anticoagulant drug. After the administration of warfarin sodium the prothrombin complex activity, the cumulative LD50, and the half life of warfarin differ by the factor 10 between the two species. As the clotting effect depends to a higher degree on the extent of the plasma binding, the binding properties of warfarin sodium on the serum proteins of mice and rats were determined by equilibrium dialysis. The maximum percentage of bound warfarin sodium (β) up to a plasma level of 150 μmol per liter was found to be 99.1% on rats but only 91.6% on mice, corresponding to 0.9% and 8.4% of the free drug respectively. The binding capacity (K) is 125.5 on rats and 17.3 on mice. The results characterize a strong binding of warfarin sodium on the serum proteins of rats, but only a relatively weak one on the serum of mice. They explain the known small effect of this anticoagulant drug on mice. (Author abstract by permission, edited)

75-0681. Sarkander, H. I. (Pharmakol. Inst., Freie Univ., Berlin, Germany). **Temporal relationship between rat liver histone acetylation and nuclear RNA polymerase activities after α-hexachlorocyclohexane application.** *Naunyn-Schmiedeberg's Arch. Pharmacol. 282: R83; 1974.*

α-Hexachlorocyclohexane (α-HCH, α-BHC) treatment (200 mg/kg) of rats leads to a significant increase in the rate of acetyl incorporation into liver histones by incubation of isolated nuclei in the presence of acetyl-^{3}H-coenzyme A. The time course of histone acetylation peaks sharply at about 2 hr then declines rapidly to the control value before rising steadily again with a second peak at 24 hr which reaches about four times the control value. The assumption of a connection between this observed increase of rat liver histone acetylation and changes in the chromatin-templated transcription was examined. The initiation and time course of DNA-dependent RNA polymerase activities in isolated liver nuclei at different times after α-HCH application were determined in order to get information on transcription activity. Polymerase (I) activity, measured at high ionic strength in the presence of Mn^{++} ions, increases continuously and reaches a maximum at the end of 8 hr whereas polymerase (II), measured at low ionic strength in the presence of Mg^{++} ions, shows no increased activity up to this time. Aferwards, an equally continuous increase of both polymerase activities occurs, reaching a maximum between 36 and 42 hr. The temporal relationship between these events indicated that the initial acetylation peak precedes both polymerase activities while the second acetylation peak coincides with an increase in both polymerase activities. This coincidence does not establish a causal connection between these biochemical events. (Author abstract by permission, abridged)

75-0682. Schulte-Hermann, R. (Inst. Toxikol. Pharmakol., Philipps Univ., Marburg, Germany). **Control by feeding habits of the induction of hepatic DNA synthesis by α-hexachlorocyclohexane.** *Naunyn-Schmiedeberg's Arch. Pharmacol. 282: R88; 1974.*

α-Hexachlorocyclohexane (α-HCH, α-BHC) elicits growth and DNA synthesis in rat liver. The induction of DNA synthesis is subject to diurnal variations, i.e., is facilitated during the night and suppressed during the day. The timing of this rhythm is controlled by the animals' feeding habits (the rodent eats preferentially during the night): if rats are adapted to an artificial feeding schedule in which food intake is restricted to 5 hours per day, DNA synthesis begins almost synchronously 6-9 hours after onset of feeding, independently of the light-dark regimen. Since after administration of α-HCH about 18 hours are required for preparation of hepatocytes for DNA replication ("prereplicative phase"), it is concluded that the prereplicative phase consists of two sections; the cells proceed to the later one only if a second stimulus is elicited by food intake. Both stages are sensitive to actinomycin D but differ in sensitivity by a factor of 10. (Author abstract by permission)

75-0683. Sarkander, H. I.; Kemmerle, M.; Brade, W. (Pharmakol. Inst., Freie Univ. Berlin, D-1000 Berlin 33, Germany). **Rat liver histone modifications and their relationship to DNA-dependent RNA polymerase activities during α-hexachlorocyclohexane induced liver proliferation.** *Naunyn-Schmiedeberg's Arch. Pharmacol. 284(1): 39-53; 1974.* (75 references)

The time course of histone acetylation, methylation, and phosphorylation during α-hexachlorocyclohexane (α-HCH, α-BHC) induced liver cell proliferation has been studied and correlated to other biochemical events in rat liver caused by α-HCH. Both in vitro acetylation and methylation showed an initial increase 1 and 2 hr after α-HCH which obviously precedes the beginning of increased nuclear in vitro RNA synthesis. Separation of in vitro acetylated liver histones isolated 1 and 2 hr after α-HCH application results in a preferential accumulation of radioactive acetate in the range of F3,

F2b, F2a2 histone fractions and in F2at. A second peak of increased histone acetylation at 24 hr and methylation at 36 hr occurs during a period of increased nuclear RNA polymerase activities and the beginning increase of DNA synthesis. An increased in vitro histone phosphorylation was measured 42 hr after α-HCH application. From the different time courses of these nuclear events it seems possible that the early histone acetylation and methylation might be involved in the beginning increase of transcriptional activity. Further experiments will be necessary to find out whether the α-HCH induced histone modifications occurring at 1,2 hr and 24, 36, 42 hr are biologically significant in the sense of a causal connection for α-HCH caused increase of transcriptional activity, DNA replication or enzyme induction or whether they are independent of each other and merely coincide. (Author abstract by permission)

75-0684. Sulik, M. (Dept. and Inst. Pathol. Anat., Med. Acad., Bialystok, Poland). **Badania morfologiczne i histochemiczne plus i watroby szczura w przewleklym zatruciu agronexem. [Morphological and histochemical changes in the lungs and liver of rats poisoned with agronex.]** *Patol. Pol. 25(1): 27-33; 1974.* (14 references) (Polish)

Morphological and histochemical changes were studied in the lungs and livers of male Wistar rats exposed to 156 mg/m^3 respirable agronex (thiram) in the air for 10 or 20 min every two days for 90 days. A reaction of the pulmonary lymphatic system and degenerative changes in the bronchi, hyperemia, hemorrhage, increased number of argentophil fibers, thickening of collagen fibers, and degeneration of the elastic fibers in the alveoli were observed. Examinations of liver samples revealed depletion of the glycogen and protein reserves, increased acid phosphatase activity, necrosis of a few cells, and disintegration of argentophil fibers of the sinus vessels of the peripheral part of the lobules. The intensity of the changes in both organs was proportional to the amount of the pesticide absorbed.

75-0685. Biernat, S.; Giermaziak, H. (Inst. Pathol. Anat., Lodz, Poland). **Zmiany patomorfologiczne w miesniu sercowym i we wsierdziu krolika po ostrym zatruciu intrationem i po niektorych zwiazkach odtruwajacych. [Pathomorphological lesions of the myocardium and endocardium in rabbits following acute intoxication with intrathion and the action of various detoxifying agents.]** *Patol. Pol. 25(1): 59-66; 1974.* (14 references) (Polish)

Pathomorphological investigations of the myocardium and endocardium of rabbits poisoned with intrathion and the antagonists PAM and atropine are presented. The animals were poisoned with an LD50 dose (100 mg/kg) of intrathion by i.p. injection, and other groups were administered 7 mg/kg doses of PAM or 0.5 mg/kg doses of atropine i.v. Twenty-four hours after poisoning, toxic lesions and fibroblast proliferation were observed in the myocardium and endocardium. In rabbits also treated with the antidotes, the lesions were more pronounced as compared with those treated only with intrathion. The intensity of the changes was due to antidote overdose. PAM was particularly harmful.

75-0686. Hawkins, D. R.; Down, W. H.; Chasseaud, L. F.; Lewis, J. D. (Dept. Metab. and Pharmacokinetics, Huntingdon Res. Cent., Huntingdon, England). **The metabolic fate of tridemorph in rats.** *Pestic. Sci. 5(5): 535-542; 1974.* (13 references)

A single oral dose of [^{14}C]tridemorph was partly, but rapidly absorbed by rats. Most of the radioactivity was excreted with a half-life of about 15 hr. During 5 days, 42.6% was excreted in the urine, 46.7% in the feces, 1.5% in the expired air, and 3.4% was still retained. Twenty-four per cent was excreted in the 48 hr bile. Sequential whole-body autoradiography indicated that much of the radioactivity was confined to the gastrointestinal tract, liver, and kidneys. There was no unexpected uptake of radioactivity. Urinary metabolites were more polar than tridemorph and were also detected in the bile and feces. The major metabolite in 24 hr urine, accounting for 22.3% of the dose, appeared to be a side-chain hydroxylated derivative. Cleavage of the morpholine ring was limited to about 1.5% of the dose. (Author abstract by permission)

75-0687. Brown, V. K. H.; Robinson, J.; Thorpe, E. (Shell Res. Ltd., Tunstall Lab., Sittingbourne, Kent, England). **The toxicity of dieldrin (HEOD) to domestic fowl.** *Pestic. Sci. 5(5): 567-586; 1974.* (30 references)

Domestic fowl were fed control diet or diets containing 10 or 20 μg/g HEOD. Eggs and samples of blood were collected in intervals and the concentration of HEOD was determined. The concentrations of HEOD in body tissues were also determined after 7 and 13 months. Some of the birds died, but the health of the remainder appeared to be unaffected. The hens of the 20 ppm group showed an increased egg production, but chick mortality in this group was higher than in the other two groups. The dynamics of HEOD in domestic fowl were qualitatively similar to that in other vertebrates and was consistent with the mamillary type compartmental model. (Author abstract by permission)

75-0688. Briggs, D. E.; Waring, R. H.; Hackett, A. M. (Dept. Biochem., Univ. Birmingham, Birmingham B15 2TT, England). **The metabolism of carboxin in growing barley.** *Pestic. Sci. 5(5): 599-607; 1974.* (22 references)

The major soluble metabolite of carboxin (2,3-dihydro-6-methyl-5-phenylcarbamoyl-1,4-oxathiin) in barley seedlings and mature plants was identified as the *p*-hydroxy phenyl derivative. This phenol was also bound to the lignin fraction. The distribution of carbo-

xin and its metabolites in seedlings and mature plants grown from treated seed was studied; maximum residues were found in the three oldest internodes, with traces in the roots and flowering heads. Treated plants had altered chlorophyll/carotenoid ratios, and raised levels of some free amino acids. (Author abstract by permission)

75-0689. Grossbard, E.; Marsh, J. A. P. (A.R.C. Weed Res. Organ., Begbroke Hill, Yarnton, Oxford OX5 1PF, England). **The effect of seven substituted urea herbicides on the soil microflora.** *Pestic. Sci. 5(5): 609-623; 1974.* (27 references)

Chloroxuron, diuron, fluometuron, metobromuron and monuron added to soil at 500 ppm a.i. on a dry weight basis caused an initial stimulation of CO_2 production, followed by indications of inhibition. Nitrification was clearly inhibited, particularly by monuron and metobromuron. Metoxuron at 5 and 50 ppm a.i. had no effect on CO_2 output and nitrification, but at 500 ppm a.i. both were greatly reduced. Numbers of fungal propagules were temporarily lower at 50 ppm a.i., and severely curtailed at 500 ppm a.i. but total counts of bacterial propagules were greatly increased. Linuron had an inhibitory effect on CO_2 evolution at 500 ppm a.i. but this varied in extent and duration; some reduction was also found at 50 ppm a.i. At 500 ppm a.i. there was no effect on mineralization of N but in soil supplemented with ammonium sulphate nitrification was reduced. Changes in microbial equilibrium occurred, but were less marked than with metoxuron. Cellulose decomposition was also reduced. Small amounts of 3,4-dichloroaniline were found in linuron-treated soils, but microbial activities were not affected when 5 ppm 3,4-dichloroaniline was added to the soil. However, at 140 ppm microbial activities were affected adversely, but in a different pattern to that for linuron; nitrification was severely reduced, but numbers of fungal propagules were hardly affected, suggesting that the effects observed in linuron-treated soil were not due to this metabolite. (Author abstract by permission)

75-0690. Roujeau, J.; Pfister, A.; Nogues, C.; Leclerc, J. P. (Serv. Cent. Anat. Cytol. Pathol., Hop. Lariboisiere, Paris, France). **Fibroses pulmonaires et intoxications. [Pulmonary fibroses and poisoning.]** *Poumon Coeur 29(5): 643-647; 1973.* (13 references) (French)

The mechanism of the development of lung fibrosis in poisoning with paraquat and its analogy with poisoning by oxygen and ozone were studied in animal tests. Two days after poisoning by i.p. injection of 25 mg/kg doses of paraquat to Wistar rats, lung tissue sections examined by electron microscopy revealed interstitial edema in the alveolar wall, dissociation of the rare collagen fibers, congestion of the alveolar lumina by cell fragments, membranes, altered mitochondria, and lamellar formations. Other findings were zonal liquefaction of the cytoplasm with lipid inclusions, vesiculation of the membranes, rarefaction and sharp alteration of the granular pneumocytes, and turgescence and pinocytosis of the endothelial cells. Thickening of the capillary walls, abundance of active fibroblasts of the edematous interstitium, collagen or reticulin type fibrillogenesis, and regeneration of the pneumocytes were observed on the 8th day. Similar alterations were observed in rats poisoned with oxygen or ozone. The interstitial edema is thought to cause multiplication of septal cells and of macrophages, and this infiltration gives rise to fibrillogenesis. Fibrosis may be caused by the alteration of the capillary walls due to the depolymerization of the basal layer, the disruption of the endothelial cells, and the alteration of the surfactant which is a primary or secondary effect of the alteration of the secretory cells.

75-0691. Wilson, B. W.; Walker, C. R. (Dept. Avian Sci., Univ. California, Davis, CA 95616). **Regulation of newly synthesized acetylcholinesterase in muscle cultures treated with diisopropylfluorophosphate.** *Proc. Nat. Acad. Sci. USA 71(8): 3194-3198; 1974.* (23 references)

Pectoral muscles from 11-day-old chick embryos were dissociated with trypsin and the mononucleated cells grown in culture and treated with diisopropylfluorophosphate (DFP), an irreversible inhibitor of acetylcholinesterase (AChE). Brief treatment with 0.1 m*M* DFP inhibited an average of 89% of the AChE activity in the cultures. As long as protein synthesis occurred, an average of 78% of the activity returned within 4 hours. Newly synthesized AChE did not stain cytochemically, was rapidly and extensively degraded or released in the presence of 10 μM cycloheximide, and consisted mainly of low-molecular-weight forms. AChE activity first appeared around the nucleus, about 4 hours after DFP treatment, then spread to the rest of the cell about the time the release of AChE was detected in the medium. With time, more and more of the enzyme was retained in the cells after treatment with cycloheximide, and the proportion of low-molecular-weight forms decreased, while high-molecular-weight forms increased. The data suggests that newly synthesized AChE undergoes an orderly process of binding, movement, and assembly in DFP-treated, and probably untreated, embryo muscle fibers.

75-0692. Weis, P.; Weis, J. S. (Dept. Anat., New Jersey Med. Sch., Newark, NJ 07103). **Cardiac malformations and other effects due to insecticides in embryos of the killifish, *Fundulus heteroclitus*.** *Teratology 10(3): 263-268; 1974.* (21 references)

Exposure of early *Fundulus* embryos to concentrations of DDT and malathion up to 10 ppm had no gross developmental effects. Exposure to 10 ppm of carbaryl and parathion, however, caused developmental arrest prior to the initiation of heartbeat. When embryos were removed from carbaryl after three days of exposure most recovered and developed normally. Exposure for

longer periods of time caused most embryos to develop a circulatory failure in which the heart remained a feebly beating thin tube and circulation was absent. In addition, blood pigment did not form. Other tissues, however, apparently continued developing fairly normally. Such embryos did not hatch. A similar syndrome developed in parathion-treated embryos after somewhat shorter times of exposure. (Author abstract by permission)

75-0693. Verschuuren, H. G.; Kroes, R. (Lab. Toxicol., Nat. Inst. Public Health, Bilthoven, The Netherlands). **Triamiphos: long-term toxicity and three-generation reproduction studies in rats.** *Toxicology 2(4): 327-338; 1974.* (7 references)

Triamiphos (0.1, 0.5, and 2.5 ppm) was investigated in a long-term feeding study over 2 yr and in a 3-generation reproduction study using Wistar SPF rats. In neither study was food intake, body weight gain, behavior, or mortality affected. In the 2 year study, groups receiving the 0.5 and 2.5 ppm dose showed a decreased number of erythrocytes in females after 3 months. The hemoglobin content was low for these dose levels. Cholinesterase inhibition was strong in the 2.5 ppm group. In the 0.5 ppm group, cholinesterase inhibition in males averaged 15% over 2 yr; in females, 12%. No depression of total blood cholinesterase was noted in the 0.1 ppm level group. The total tumor incidence was high; in 200 rats 93 tumors or tumor-like processes were found. There was no indication of the carcinogenic action of this compound. In the 3-generation study a decrease in the number of erythrocytes with a lower hemoglobin content and packed cell volume were observed in only the F_2 generation in the 2.5 ppm group. The cholinesterase activity of erythrocytes was inhibited in the 0.5 ppm group in the P generation, but not in the F_1, F_2, and F_3 generations. In the 2.5 ppm group, cholinesterase was inhibited in all generations. Erythrocyte cholinesterase activity was more inhibited than plasma cholinesterase and brain cholinesterase activity. No effects on reproductive performance were noted.

75-0694. Den Tonkelaar, E. M.; Van Esch, G. J. (Lab. Toxicol., Nat. Inst. Public Health, Bilthoven, The Netherlands). **No-effect levels of organochlorine pesticides based on induction of microsomal liver enzymes in short-term toxicity experiments.** *Toxicology 2(4): 371-380; 1974.* (29 references)

The following organochlorine pesticides were given in the diet to male Wistar and SPF rats during 2 weeks: DDT, dicofol, chlorfenson, tetrasul, V110 (tetrasul sulfoxide), tetradifon, lindane, TDE, dichlobenil, endosulfan, dieldrin, heptachlor, chlordane, HCB, methoxychlor, and polychlorinated biphenyls. The induction of microsomal liver enzymes by dose levels ranging from 2 to 200 ppm of these compounds was studied. Through this process no-effect levels were established. These levels were compared with no-effect levels from the literature, based on histopathological abnormalities in the liver in long-term experiments. In general, good agreement was found. The no-effect levels determined in this study for dicofol (5 ppm), chlorfenson (2 ppm), and chlordane (5 ppm) were much lower than those recorded in the literature. The capacity for inducing enzymes decreased in the order: heptachlor, DDT, chlorfenson, dieldrin, dicofol, chlordane, tetrasul, V 110, hexachlorobenzene, lindane, endosulfan. Polychlorinated biphenyls had a very high enzyme-inducing capacity for aniline hydroxylase, but only a medium one for aminopyrine demethylase and hexobarbital oxidase.

75-0695. Wheeler, L.; Strother, A. (Clin. Pharmacol. Unit, Harvard Med. Sch., Beth Israel Hosp., Boston, MA 02215). **Placental transfer, excretion, and disposition of (^{14}C)Zectran and (^{14}C)Mesurol in maternal and fetal rat tissues.** *Toxicol. Appl. Pharmacol. 30(2): 163-174; 1974.* (14 references)

Pregnant Sprague-Dawley rats were injected i.p. on the 18th and 19th days of gestation with a tracer dose of [^{14}C]Zectran (mexacarbate) or [^{14}C]Mesurol (methiocarb) (M). The excretion and distribution of total ^{14}C were examined in fetal and maternal tissues. The distribution of Zectran and Mesurol after an i.p. dose was characterized by rapid maternal distribution and placental transfer. A distribution and elimination phase was seen for 30–60 min postinjection. After 1 hr [^{14}C]Zectran in the whole fetus fell very slowly (Ke = 0.086 hr). At 15 min 1.7 and 3.5% of an administered dose of Zectran and Mesurol, respectively, was recovered from the pooled fetuses of a rat dam. After 8 hr, 0.8 and 1.1%, respectively, of the administered ^{14}C was still present in the pooled fetuses. Fetal kidney and heart contained the most ^{14}C after both Zectran and Mesurol administration. Liver was the maternal tissue with highest ^{14}C content. More radioactive $^{14}CO_2$ derived from [^{14}]Zectran and [^{14}C]Mesurol was exhaled by the nonpregnant rat (Z = 82.6%; M = 76.7%) than by the pregant rat (Z = 62.2%; M = 66.9%). There was no significant difference in urinary excretion of ^{14}C by pregnant or nonpregnant rats with either Zectran or Mesurol administration. Based on total ^{14}C activity recovered in the urine, feces, and exhaled air after 8 hr, the pregnant animal retained 10.4-23% more ^{14}C than the nonpregnant rat treated with either Zectran or Mesurol. (Author abstract by permission)

75-0696. Lindquist, N. G. (Dept. Toxicol., Univ. Uppsala, Uppsala, Sweden). **An autoradiographic study on the distribution of the herbicide 4-chloro-2-methylphenoxyacetic acid in pregnant mice.** *Toxicol. Appl. Pharmacol. 30(2): 227-237; 1974.* (20 references)

Whole body autoradiography was performed after varying intervals from 5 min up to 72 hr following i.v.

injection of [^{14}C]4-chloro-2-methylphenoxyacetic acid (MCPA) in pregnant mice. The distribution pattern was characterized by a high concentration in the blood up to 4 hr, and an accumulation in the visceral yolk sac epithelium up to 24 hr after the injection. The radioactive substance passed the placenta, but the fetal tissues never reached the concentration of the maternal tissues. There was no site of accumulation in the fetal tissues. No retention occurred in either the maternal or the fetal tissue 48 hr after the injection. The distribution of [^{14}C]MCPA was observed to be similar to that found earlier for [^{14}C]2,4-dichlorophenoxyacetic acid (2,4-D) and [^{14}C]2,4,5-trichlorophenoxyacetic acid (2,4,5-T). The uptake, however, of [^{14}C]MCPA and [^{14}C]2,4-D in the visceral yolk sac was weaker than that of [^{14}C]2,4,5-T. These results indicate a teratogenic mode of action for MCPA, similar to the one which has been postulated for 2,4,5-T (i.e., inhibition of the embryotrophic nutrition). It is also possible that a synergistic effect may occur between MCPA, 2,4-D, and 2,4,5-T with respect to their teratogenic action. (Author abstract by permission)

75-0697. Schwetz, B. A.; Norris, J. M.; Kociba, R. J.; Keeler, P. A.; Cornier, R. F.; Gehring, P. J. (Toxicol. Res. Anal. Lab., Dow Chem. Corp., Midland, MI 48640). **Reproduction study in Japanese quail fed hexachlorobutadiene for 90 days.** *Toxicol. Appl. Pharmacol. 30(2): 255-265; 1974.* (7 references)

Adult male and female Japanese quail were fed diets containing 0.3, 3, 10, or 30 ppm of hexachlorobutadiene (HCBD) or 20 ppm of hexachlorobenzene (HCB) for 90 days. HCBD at all dose levels had no effect on body weight, demeanor, food consumption, egg production, the percent fertility and hatchability of eggs, the survival of hatched chicks, and eggshell thickness. The birds showed no evident signs of toxicity during the study. In addition, there were no gross or histopathologic changes evident in the organs or tissues of birds at the termination of the study which could be related to treatment. Ingestion of a diet containing 20 ppm HCB resulted in decreased survival of chicks hatched during the study and an increase in the liver weight of adult birds at the end of the study. No other treatment related changes were observed. (Author abstract by permission)

75-0698. Sheinman, R.; Yannai, S. (Dept. Food Eng. Biotechnol., Technion-Israel Inst. Technol., Haifa, Israel). **Toxicity of dieldrin to primary culture of rat fetal liver cells and human kidney cell line.** *Toxicol. Appl. Pharmacol. 30(2): 266-274; 1974.* (10 references)

Rat fetal liver primary culture cells (RLP) were exposed to 25-200 μg dieldrin/ml medium for 48 hr. The morphologic changes observed included granulation and shrinkage of the cytoplasm, formation of long and narrow cytoplasmic projections, and appearance of giant cells. At the higher concentrations the morphologic changes were noted within a few hours after exposure to the pesticide, and a considerable number of cells were separated from the monolayer. At the 22 μg/ml level there was some decrease in the number of viable cells and a reduction in the total protein, DNA, and RNA contents of the cells. All the chemical and morphologic effects of the challenge were dose related. Concentrations above 100 μg/ml brought about a complete destruction of the cell monolayer. Human kidney cell line B culture was slightly less sensitive than the RLP cells, but demonstrated similar morphologic alterations when challenged by slightly higher dieldrin concentrations. (Author abstract by permission)

75-0699. Abbasov, T. G. (All-Union Sci. Res. Inst. Vet. Sanit., USSR). **Vliyaniye khlorofosa, fosfamida, trikhlormetafosa-3 i metilnitrofosa na organizm krolikov pri dlitel'nom skarmlivanii ikh s kormom. [Effect of chlorophos, phosphamide, trichlorometaphos-3, and methylnitrophos on rabbits following long-term feeding.]** *Tr. Vses. Nauch.-Issled. Inst. Vet. Sanit. 39: 220-227; 1971.* (5 references) (Russian)

General pathomorphological and biochemical changes were studied in the organs and tissues of rabbits fed a feed containing trichlorfon, dimethoate, trichlorometaphos-3, and methylnitrophos (fenitrothion) in a 3-month-experiment. Considerable reduction in the blood cholinesterase activity, slight degree of hyperemia and proliferative processes in the liver, and slight depression of the cellular cholinesterase activity in the lungs and kidneys were observed in animals fed 15 mg trichlorfon per kg. Reduction of weight gain, inhibition of blood cholinesterase activity, congestive hyperemia in the liver, atrophy of the kidney, and moderate reduction of cholinesterase activity in the lungs, kidneys and myocardium were noted in animals fed 30 mg trichlorfon per kg. Pronounced pathological changes were observed in the liver, kidney, lungs, and other organs of rabbits fed 20 mg dimethoate per kg. A lower dose of 10 mg/kg was ineffective. Considerable reduction of cellular esterases especially in the lungs, heart, and kidney, reduction of body weight, and considerable pathoanatomical changes in organs and tissues were observed in another group fed 10 mg of methylnitrophos or trichlorometaphos-3. A lower dose of 5 mg/kg produced only a slight effect. Pronounced physiological accumulation of the latter two compounds was evident.

75-0700. Yasnova, G. P.; Abbasov, T. G.; Tsaregorodtseva, G. N. (All-Union Sci. Res. Inst. Vet. Sanit., USSR). **Patomorfologicheskiye i gistokhimicheskiye izmeneniya v organakh i tkanyakh telyat pri khronicheskom postuplenii nekotorykh fosfororganicheskikh insektitsidov s kormom. [Pathomorphological and histochemical changes in organs and tissues of calves following prolonged addition of organophosphorus insecticides to their feed.]** *Tr. Vses. Nauch.-Issled. Inst. Vet. Sanit. 39: 228-233; 1971.* (5 references) (Russian)

Pathomorphological and histochemical changes were studied in organs and tissues of calves fed trichlorfon, methylnitrophos (fenitrothion), trichlorometaphos-3, and dimethoate in their feed in a chronic experiment. Hemodynamic changes, characterized by congestive hyperemia, multiple focal hemorrhages in the parenchymatous organs and the gastrointestinal tract, and pulmonary edema with catarrhal pneumonia and atelectasis, as well as dystrophic processes in the liver, heart, kidney, and brain, and cell proliferation in the brain, small intestines, and parenchymatous organs were observed upon autopsy of animals fed large doses of the organophosphorus pesticides. The cholinesterase activity in the liver, brain, heart, and muscles was inhibited by 75 to 100%. No pathomorphological changes, nor inhibition of the cholinesterase activity were observed in animals fed 6.3 and 3.5 mg dimethoate, 8.56 and 4.21 mg of trichlorometaphos-3, 5.5 mg of methylnitrophos, and 7.78 mg of trichlorfon per kg of feed.

75-0701. Newmark, S. R.; Dluhy, R. G.; Bennettt, A. H. (Dept. Med., Peter Bent Brigham Hosp., Boston, MA). **Ectopic adrenocorticotropin syndrome with prostatic carcinoma.** *Urology 11(6): 666-668; 1973.* (9 references)

A 57-year-old Caucasian male was admitted to the hospital with an acute psychosis and for treatment of metastatic prostatic cancer. Hematuria appeared 4 years prior to admission, and subsequent examinations revealed adenocarcinoma of the prostate. Treatment comprised transurethral resection and bilateral orchiectomy. Chlorotrianisene (25 mg twice daily) was begun 1 year later. He was subsequently admitted to the hospital with widespread osteoblastic lesions. Steroid data indicated maximal stimulation of the adrenal gland with high basal 17-hydroxycorticoid excretion levels which did not significantly change from control following ACTH stimulation or dexamethasone suppression. Plasma ACTH was 1590 pg/ml (normal $<$ 120 pg/ml). The patient was treated orally with *o,p'*-DDD (TDE), metyrapone, spironolactone, and dexamethasone. He died 12 days later.

75-0702. Nepoklonov, A. A.; Bukshtynov, V. I. (Author address not given). **O srokakh vydeleniya khlorofosa iz organizma ovets pri aerozol'noy obrabotke. [Chlorophos release time from sheep after aerosol treatment.]** *Tr. Vses. Nauch.-Issled. Inst. Vet. Sanit. 39: 200-202; 1971.* (3 references) (Russian)

The elimination of trichlorfon was studied in sheep treated with a concentration of 4 g/m^3 in aerosol form in a closed space. Trichlorfon residues ranging from 1.4 to 2.3 mg/kg were found in muscles, heart, liver, kidney, spleen, lungs, brain, and milk samples one day after treatment. The residue levels were highest (2-2.3 mg/kg) in the muscles, spleen, and kidney. Residues were found in the liver and kidney for over 7 days, in the heart, spleen, and muscles for 7 days, and in the lung and brain for 6 days after treatment. Trichlorfon was excreted in the milk for 5 days in concentrations ranging from 0.4 to 0.8 mg/kg. No trichlorfon residues were detected in organ samples after 10 days. Partial metabolism of trichlorfon into DDVP was observed in the liver, spleen, and kidney. The slaughter of sheep treated with trichlorfon aerosol in closed space is permitted not earlier than 10 days after treatment.

75-0703. Nikandrov, V. N. (Belorussian Sci. Res. Inst. Vet., USSR). **Aktivnost' malatdegidrogenazy ve nekotorykh organakh i tkanyakh belykh krys pri vvedenii aminnoy soli 2,4-dikhlorfenoksiuksusnoy kisloty. [Malate dehydrogenase activity in some organs and tissues of white rats following administration of amine salt of 2,4-dichlorophenoxyacetic acid.]** *Vestsi Akad. Navuk Belarus. SSR Ser. Biyal. Navuk 1: 126-127; 1974.* (Russian)

The effects of single 380 or 190 mg/kg oral doses of 2,4-D were studied on the different forms of malate dehydrogenase in the brain, liver, and skeletal muscles of white rats. Administered in a dose of 380 mg/kg, 2,4-D activated the malate dehydrogenation in the brain during the first hour, and inhibited it 3 hours later. The inhibition peaked at 13.1% 6 hr after poisoning. The free activity increased by 13.9%, and the bound activity decreased by 31% during the first hour. Activation of the free malate dehydrogenase by 12.9%, and inhibition of the bound malate dehydrogenase by 79.8% were observed after 6 hr. In the liver bound malate dehydrogenase decreased by 71% 6 hr after poisoning. Malate dehydrogenation increased during the first three hours; after 6 hr, overall malate dehydrogenation activity decreased by 19%, and bound activity by 53.1% in the skeletal muscles.

75-0704. Roed-Petersen, J. (K Dept. Dermatol., District Hosp., Copenhagen, Denmark). **Forlobet af scabies under systemisk og lokal steroidbehandling. [The course of scabies during systemic and local steroid therapy.]** *Ugeskr. Laeg. 136(5): 262-263; 1974.* (7 references) (Danish)

The therapy of Norwegian scabies in a healthy, 80 year-old female is described. Local and systemic steroid therapy resulted in extensive scabies development due to suppression of the immune response. Treatment with 1% hexachlorocyclohexane (BHC) was, however, fully efficient.

75-0705. Samokhvalov, A. N. (Dept. Soil Cultivation, I. M. Lomonosov State Univ., Moscow, USSR). **Vliyaniye prometrina na mikrofloru dernovo-podzolistoy pochvy. [Effect of prometryne on the microflora of sod-podzolic soil.]** *Vestn. Mosk. Univ. Biol. Pochvoved. 28(4): 87-92; 1973.* (11 references) (Russian)

The effect of prometryne on soil microorganisms was studied in sod-podzolic soil planted to sunflower, as well as in laboratory tests. When applied in the commonly used dose of 2 kg/ha, prometryne failed to cause any essential change in the number of microorganisms present. Prometryne is rather rapidly inactivated in the soil because of adsorption on soil colloids. Higher doses of 5, 25, 50, and 100 kg/ha sharply increased the count of bacteria growing on bouillon-peptone agar, and caused changes in the taxonomic composition of the microflora during the first 30 days after application.

75-0706. Syarogin, V. V. (Belorussian Sci.-Res. Inst. Vet., USSR). **Razmerkavanne butylavaga efiru 2,4-D u organakh i tkankakh trusoy pry eksperymental'nym atruchvanni. [Distribution of 2,4-D butyl esters in the organs and tissues of rabbits during experimental poisoning.]** *Vestsi Akad. Navuk Belarus. SSR Ser. Sel'skagaspad. Navuk 4: 121-123; 1973.* (6 references) (Belorussian)

The distribution and elimination of 2,4-D butyl esters in rabbits was studied. The animals were given single doses of 150 and 490 mg/kg body weight via stomach tube. The residue levels were highest in the kidneys, liver, spleen, lungs, heart, brain, blood, and urine. Residues were detected as early as 15 min after administration in the blood, urine, feces, kidneys, liver, and heart. Most of the residue was eliminated from the organism with the urine and feces in the first 72 hr after poisoning. Complete elimination of 2,4-D butyl ester residues from all organs in 24 hr was observed.

75-0707. Galeno, N.; Perottino, R. (Ist. Zooprofil. Speriment., Turin, Italy). **First investigations on the possible presence of pesticide residues in semen from bulls before and after experimental treatment.** *Vet. Ital. 24(7-8): 295-309; 1973.* (17 references)

A gas chromatographic analysis was conducted on the semen of bulls which had been treated with some common pesticides. Two bulls of the Piedmontese breed received lindane (10 mg), heptachlor (5.0 mg), aldrin (2.0 mg), DDT (10 mg) each per kg live weight, divided into 10 doses in gelatin capsules administered p.o. over a period of 12 days. Semen was sampled at intervals of 3 to 7 days, beginning with the fourth dose of pesticides. Analyses showed low basic levels of pesticides in untreated bulls, under the 0.010 ppm value for the chlorinated hydrocarbons and not exceeding 0.03 ppm for parathion. The sharpest increase in concentration following dosing occurred for lindane. Heptachlor residues showed a static tendency, perhaps due to the formation of heptachlor epoxide and subsequent storage in fat tissue. Aldrin was not found; however, increasing levels of its epoxide, dieldrin, were noted. DDT residue levels became more consistent throughout the course of administration, to a maximum of 0.031 ppm, in the form of its metabolites. Accordingly the semen displayed the absorption, metabolism, and elimination processes already observed in some bovine tissues, with a somewhat varying pattern of distribution.

75-0708. Snow, D. H. (Dept. Vet. Pharmacol., Univ. Glasgow, Glasgow, Scotland). **Studies on the action of an anthelmintic preparation of dichlorvos in horses.** *Vet. Rec. 95(11): 231-233; 1974.* (18 references)

The effect of the organophosphorus anthelmintic dichlorvos on plasma cholinesterase was investigated in seven horses. A marked depression in the plasma cholinesterase levels was noted (up to 87%) with very gradual recovery to normal levels (> 49 days). Nine days after treatment, the plasma cholinesterase levels were still less than 50% of initial values. These results indicate that it may be hazardous to administer succinylcholine chloride for a considerable period of time after treatment with dichlorvos. Studies in two horses indicated that plasma cholinesterase is inhibited preferentially with regard to red blood cell acetylcholinesterase. The performance of four horses, measured by a gallop test, was not affected by dichlorvos administration.

75-0709. Khan, M. A. (Res. Sta., Canada Dept. Agr., Lethbridge, Alberta, Canada). **Toxicity of systemic insecticides: efficacy of dermal and parenteral applications of crufomate for systemic control of *Hypoderma* spp. in cattle.** *Vet. Rec. 93(20):528-532; 1973.* (17 references)

Crufomate used dermally as a 0.5% spray, 8.3% pour-on, or 12% spot-on application, or given as an i.m. or i.p. injection of 10 mg/kg, was 93% or more effective for the systemic control of cattle grubs on beef-type range calves aged 5-7 months. The treatments were applied before the Canadian deadline of November 30th, but this did not prevent an incidence of sickness in calves weighing less than 136 kg; in larger calves no sickness was observed. More calves became sick in the sprayed groups than in the other groups. Clinical signs observed were of organophosphorus poisoning rather than of cattle grub anaphylaxis. An effect of systemic control of cattle grubs on the average daily weight gain of the calves was observed only in the animals treated by the spot-on method and even then was statistically insignificant. High levels of crufomate residues were present in the hair of the calves 30 days after treatment with a spray or pour-on application of the insecticide.

75-0710. Manevich, Zh. I.; Zhavoronkov, N. I.; Molochnikov, V. V. (All-Union Sci. Res. Inst. Dairy Industry, USSR). **Vydeleniye sevina s molokom pri razlichnykh putyakh vvedeniya. [Excretion of carbaryl in milk as a function of the route of administration.]** *Veterinariya 6: 97-98; 1974.* (Russian)

The excretion of carbaryl in milk following skin

application and ingestion was studied in cows. Carbaryl residues were detected for 10 days in milk from cows sprayed with 2 liters of a 1% aqueous suspension of carbaryl. After an initial level of 0.04 mg/l in milk, the carbaryl residue dropped to 0.02 mg/l by the third day. After twofold treatments of this type, carbaryl persisted for 13 days in milk. The elimination was more rapid following ingestion of 50 mg/kg carbaryl in aqueous suspension. Traces of 1-naphthol were detected on the seventh day. Neither carbaryl nor its metabolite was detected in the milk of cows fed a diet with 50 to 200 mg/kg carbaryl, i.e., a daily intake of 0.7-2.8 g, for seven days. It is concluded that lactating cows should not be treated with carbaryl spray.

75-0711. Yevdokimov, E. S.; Prigarin, Yu. N. (Turkmen Sci. Res. Inst. Livestock Farming, USSR). **Vliyaniye khlororganicheskikh soyedineniy na organizm zhivotnykh. [Effects of organochlorine compounds on animals.]** *Veterinariya 6: 98-99; 1974.* (Russian)

The toxic effect of DDT and BHC in one-year-old bulls was studied. The animals were orally administered DDT or BHC at 200 mg/kg body weight daily for one-month periods with intervals of 1-16 days. Depression, asthenia, irritability, motor disorders, reduced weight gain, and head and muscle tremors were observed. Histological investigations revealed hyperplasia of the lymphadenoid tissue with marked reactive centers in the lymph nodes, dilation of the lymphatic follicles with accumulation of lymphocytes in the spleen, metaplasia with stratified epithelium and hyperkeratosis in the abomasal mucosa, catarrhal inflammation in the duodenum, pronounced lobation and swollen cells in the liver, hyperemia of the renal vessels with diapedetic hemorrhage, hyperemia and diapedetic hemorrhage in the capillaries of the cerebrum, cerebellum, and medulla oblongata, and non-suppurative encephalomyelitis affecting primarily the gray matter.

75-0712. Tishkov, A. I. (All-Union Sci. Res. Inst. of Non-Contagious Animal Diseases, USSR). **Patomorfologicheskiye izmeneniya u ptits pri otravlenii pestitsidami. [Pathomorphological changes in pesticide-poisoned birds.]** *Veterinariya 7: 111-112; 1974.* (Russian)

Pathomorphological and cytopathological changes caused by 100, 80, 20, and 10% LD100 doses of granosan, agrosan, agronal, mercuran, and mercurhexane were studied in ducks and chickens in acute and subacute poisoning tests. Observed abnormalities included changes in circulation; protein-type and fatty degeneration of the liver, kidney, and myocardium; inflammatory-necrotic processes of the gastrointestinal tract; areactive necrosis in the liver and kidney; catarrhal-hemorrhagic inflammation with focal necrosis in the stomach; catarrhal or catarrhal-hemorrhagic enteritis; fibrinous-necrotic, catarrhal, or hemorrhagic colitis; hyperemia, stasis, perivascular edema, and focal hemorrhage in the liver; and hyperemia, stasis, perivascular hemorrhage, perivascular and pericellular edema, and edema of the endothelial vessels in the central nervous system. The mercury residues were highest in the liver with 49.7 mg/kg, and in the kidney with 28.4 mg/kg. The pathomorphological changes were least pronounced in organs and tissues with the highest mercury levels, and vice versa.

75-0713. Gladenko, I. N.; Babiy, L. I.; Zaytseva, L. D. (Ukrainian Sci. Res. Inst. Exp. Vet., USSR). **Izucheniye toksichnosti trolena dlya ovets. [Toxicity of trolene in sheep.]** *Veterinariya 8: 101-102; 1974.* (Russian)

The acute toxicity of trolene was studied in sheep. The pesticide was introduced in a single dose via gastric tube. The LD100 was determined to be 1,000 mg/kg. The animals died seven days after the pesticide was administered. Tremor, hypersalivation, lachrymation, stertorous respiration, and muscular fibrillation were the common clinical symptoms of acute poisoning. Inhibition of the blood cholinesterase activity, eosinopenia, lymphocytopenia, neutrophilia, increased hemoglobin and erythrocyte levels, reduced phagocytic activity of the lymphocytes, and disturbance in the protein-synthesizing function of the liver were observed following the administration of a single large dose of trolene. General hemorrhagic diathesis, hyperemia of the brain, hyperemia of the internal organs, enlargement of the lungs and gall bladder, abundance of mucus in the bronchi, and abundance of bile in the gallbladder were determined on autopsy.

75-0714. Antsiferov, S. D.; Zhavoronkov, N. I.; Yevdokimov, S. M, (All-Union Inst. Exp. Vet., USSR). **Diagnostika otravleniya zhivotnyk tetrametiltiuramdisul'fidom. [Diagnosis of animal poisoning by thiram.]** *Veterinariya 8: 104-105; 1974.* (Russian)

The acute toxic effect of thiram was studied in sheep, rabbits, and cows in order to improve the routine diagnosis of such poisoning. Large doses caused general depression, anorexia, cachexia, tremor, and death. The hemoglobin, erythrocyte, and leukocyte levels were within the physiological limits, but sharp decreases in the DNA and RNA levels, reductions of the calcium and blood sugar levels, and increases in the free nucleotide, serum protein, and phosphorus levels were observed following the administration of large doses of thiram (300 to 500 mg/kg) to sheep. Thiram did not inhibit the acetylcholinesterase activity in the brain or in the erythrocytes of the peripheral blood. Hyperemia of the parenchymatous organs, hemorrhages, serous edema, catarrhal inflammation of the gastrointestinal tract, dystrophic and necrotic changes in the kidney, and pronounced granular and focal fatty degeneration of the liver and myocardium were found on autopsy in animals treated with large doses. Poisoning by thiram can be

diagnosed by residue analysis of food, milk, and urine, and by hematological tests. Thiram can be detected in milk and urine by extraction with *n*-hexane, after which the filtrate gives a color reaction with reactive silica gel in the presence of thiram.

75-0715. Selivanova,, A. S.; Molodykh, Zh. V.; Nizamov, R. N. (Kazan Inst. Vet., Kazan, USSR). **Deystviye khlorofosa na gel'mintov i organizm zhivotnykh. [The effect of trichlorfon on helminths and on the host animal.]** *Veterinariya 9: 70-71; 1974.* (Russian)

The effects of trichlorfon on histochemical and biochemical parameters were studied in hens and helminths. Hens, artificially infested with *Ascaridia galli*, were given 50 mg trichlorfon per kg body weight either in the form of a single oral dose or in the drinking water as a form of group treatment. While the anthelmintic action was largely the same in the two different groups, more pronounced and prolonged inhibition of the acetylcholinesterase activity in all organs was observed in individually treated specimens than in the group treatments, in which inhibition was detected in the brain only. Considerable reduction of the acetylcholinesterase activity in eliminated helminths was noted. While the vitamin C levels decreased in all organs of the individually treated animals, they remained practically unchanged in the other group. Increases in the vitamin C and SH group levels in the eliminated helminths were observed. When used for group therapy, trichlorfon caused no changes in the SH group level in the tissues.

75-0716. Belyayev, V. I. (Naryan-Mar Agr. Exp. Sta., Naryan-Mar, USSR). **Vliyaniye fosfororganicheskikh veshchestv na vyvodimost' tsyplyat. [Effect of organophosphorus compounds on the hatching rate of chickens.]** *Veterinariya 9: 102-103; 1974.* (Russian)

The effect of TCM-3 (trichlorometaphos-3), amidophos (crufomate), and trichlorfon on the hatching rate of chickens was studied. These organophosphorus compounds were introduced into the yolk sac in sunflowerseed oil or in distilled water. Amidophos was applied in doses of 0.01, 0.1, 1, and 10 mg/kg; TCM-3 in doses of 0.01, 0.1, 1, 10, 20, and 200 mg/kg; and trichlorfon in doses of 0.01, 0.1, 20, and 200 mg/kg. Trichlorfon when applied in concentrations of 0.2, 1, 2, and 10 mg/kg exerted a pronounced growth stimulating effect and increased the hatching rate and survival ratio. All concentrations of the other pesticides were found to be embryotoxic, as manifested by reduced hatching rate and viability.

75-0717. Rozengart, V. I.; Freydlin, T. S.; Shcherbak, I. G.; Novikov, Yu. A. (I. P. Pavlov First Leningrad Inst. Med., Leningrad, USSR). **Fermentativnyy gidroliz *O*-etil-*S*-(omega-karbalkoksialkil) metiltiofosfonatov gomogenatami tkaney krys. [On the enzymatic hydrolysis of *O*-ethyl-*S*-(omega-carbalkoxyalkyl) methylthiophosphonates by homogenates of rat tissues.]** *Vop. Med. Khim. 20(4): 353-359; 1974.* (15 references) (Russian)

The detoxication by enzymatic hydrolysis of *O*-ethyl-*S*-(omega-carbalkoxyalkyl) methylthiophosphonates including ester groups at different distances from the phosphorus atom in the split-off part of the molecule was studied in liver and kidney homogenates as well as in diluted blood serum from male albino rats. The compounds were degraded at different rates in liver homogenates. The hydrolysis in kidney homogenates and blood serum took place at similar rates, which were close to the rate of degradation of an analogous compound without the ester group (LG-63). The preparation LG-113, the compound degraded most readily in the liver, was hydrolyzed at the P-O, P-S, and ester bonds. In kidney homogenates, this compound was split only at the P-S bond. Preparation LG-63 was hydrolyzed only at the P-S bond in both the liver and kidney.

75-0718. Shtenberg, A. I.; Khovayeva, L. A.; Zavarzin, M. V. (Lab. Pestic. Toxicol., Inst. Nutr. of the USSR Acad. Med. Sci., Moscow, USSR). **Vliyaniye khlorofosa i metilnitrofosa na nekotoryye immunnyye reaktsii organizma na fone pitaniya s nedostatochnym soderzhaniyem belka. [Effect of chlorophos and methylnitrophos on the immune reactions of the organism against the background of protein-deficient nutrition.]** *Vop. Pitan. 4: 35-42; 1974.* (9 references) (Russian)

The effect of trichlorfon and methylnitrophos (fenitrothion) on certain immune reactions was studied in Wistar rats kept on normal or protein-deficient diet. The animals were given 7 mg trichlorfon and 5 mg methylnitrophos per kg body weight daily, corresponding to 1/100 LD50, for 7.5 months. The animals were immunized with sheep erythrocytes 2.5, 7.5, and 11 months after the start of the experiment. The immunological status of the organism was fairly sensitive to the small pesticide doses used. The hemolysin titer was most sensitive in the case of normal diet, while the hemagglutinin titer was most sensitive as an indicator under the conditions of protein-deficient diet. The action of methylnitrophos was more marked and more toxic than trichlorfon. The influence of the pesticides was more pronounced under the conditions of protein-deficient diet than in the animals kept on normal diet. An inverse positive relation between the hemagglutinins and hemolysins was established.

75-0719. Viyevskiy, N. A.; Bayda, N. A. (Dept. Pathol. Physiol., Vinnitsa Med. Inst., Vinnitsa, USSR). **Izucheniye patokhimicheskoy stadii allergicheskoy reaktsii k polikhlorpinenu. [Study of pathochemical stages of allergic reaction to polychloropinene.]** *Vrach. Delo 4: 121-124; 1974.* (8 references) (Russian)

The pathochemical progression of the allergic reaction evoked by a course of six sensitizations by s.c.

injection of 0.3 mg polychloropinene was studied in guinea pigs. Following an induction period of 15-16 days, the animals were given a large i.v. dose (2 mg) of polychloropinene. This treatment produced an immediate allergic reaction, at the height of which substantial changes occurred in the histamine and neuraminic acid metabolism. Histamine levels of up to 0.28 μg/ml, reduction of the histaminase activity to 1.3 μg/ml, and reduction of the pectic properties of the blood serum and of the free heparin level were found. The pathochemical disorders correlated with the clinical manifestations as well as with the indices of the allergological and immunological tests, and indicate active participation of biogenic amines in the allergic reactions of chemical etiology.

75-0720. Doroshchuk, V. P; (Group of Electrophysiology, All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers and Plastic Materials, Kiev, USSR). **Printsipy lecheniya narusheniy dikhaniya pri ostrykh otravleniyakh polikhlorkamfenom i polikhlorpinenom. [Principles of treatment of imminent respiratory disorders in acute poisoning with polychlorocamphene and polychloropinene.]** *Vrach. Delo 4: 127-130; 1974.* (Russian)

The efficiency of various therapeutic measures in acute respiratory disorders evoked by acute poisoning with polychlorocamphene and polychloropinene was studied in rats and cats. Tremor, spasm of the respiratory muscles, tachypnea, and respiratory arrhythmia developed after administration. Both tubocurarine and atropine aggravated the course of the poisoning, while nembutal and urethane had beneficial therapeutic effects. Artificial respiration was most efficient in preventing death due to asphyxiation in all cases. Intubation was decidedly contraindicated; however, tracheotomy was effective and necessary for artificial respiration.

75-0721. Skakun, N. P.; Glukhova, L. G. (Dept. Pharmacology, Ternopol Med. Inst., Ternopol, USSR). **Kharakter i mekhanizm gepatotropnogo deystviya polikhlorpinena. [Character and mechanism of the hepatotropic action of polychloropinene.]** *Vrach. Delo 8: 128-130; 1974.* (10 references) (Russian)

The nature and mechanism of the hepatotropic action of polychloropinene was studied in adult white rats. Polychloropinene, administered in a single dose of 1/2 LD50, reduced the rate of bile secretion from 4.3-3.9 to 0.8-0.5 mg/min/100 [*sic*]. Doses corresponding to 1/10 LD50 caused only a slight reduction in the bile secretion. Cholate synthesis decreased, as did the bile acid concentration in the bile—from 1,239-878 to 31-14 mg% following a single dose of 1/2 LD50. When a dose of 1/10 LD50 was administered, polychloropinene decreased the cholate concentration by 2 to 3 times. Polychloropinene reduced the cholesterol secreting function of the liver resulting in a drop in the cholesterol level in the bile from 18-20.3 to 7.8-10.4 mg%. Polychloropinene considerably increased the bilirubin level in the bile, and also stimulated the conjugation and release of bilirubin. Treatment of rats before and during pregnancy resulted in offspring with the same type of changes in the functional status of the liver as in animals subjected to the prolonged effect of this compound. This is assumed to be the consequence of the effects of polychloropinene on the fetal liver.

75-0722. Mizyukova, I. G.; Kurchatov, G. V. (Lab. Exp. Ther., All-Union Sci. Res. Inst. Hyg. Toxicol. Pestic., Polymers, and Plastic Materials, Kiev, USSR). **Vliyaniye nekotorykh zhelchegonnykh sredstv na eliminatsiyu geptakhlora v usloviyakh eksperimenta. [The effect of certain cholegogic drugs on the elimination of heptachlor under experimental conditions.]** *Vrach. Delo 9: 136-133; 1974.* (5 references) (Russian)

The efficiency of various choleretics, such as chologon (dehydrocholic acid), oxaphenamide, and magnesium sulfate in promoting the elimination of heptachlor by adult male white rats was studied following acute poisoning. The animals were given a single dose of 60 mg heptachlor per kg body weight (minimum lethal dose) by stomach tube in the form of a 2.5% solution in sunflower-seed oil. Then they were given 150 mg/kg magnesium sulfate, 100 mg/kg dehydrocholic acid, or 250 mg/kg oxaphenamide together with dehydrocholic acid orally three times a day for 5 days, starting 3 hr after poisoning. Dehydrocholic acid, either alone or in combination with oxaphenamide, not only failed to increase the elimination of heptachlor from the organism, but even reduced the residue content in the feces and increased the residue level in the body fat. Magnesium sulfate, partly due to its laxative action, increased the excretion of heptachlor and its metabolites in the feces by 50.9%. Magnesium sulfate, sorbitol, and Barbar's salt are recommended for the rapid elimination of heptachlor from the organism.

75-0723. Pfeilsticker, K.; Rasmussen, H. (Lehrstuhl Lebensmittelwiss. Univ. Bonn, Bonn, Germany). **Umsetzung von radioaktiv markiertem Aethylenoxyd-1,2-^{14}C mit Weizeninhaltsstoffen. [Reaction of radioactive ethylene oxide-1,2-^{14}C with constituents of wheat.]** *Z. Lebensm.-Unters.-Forsch. 156(3): 158-162; 1974.* (13 references) (German)

The metabolism and distribution of radioactive carbon-labeled ethylene oxide were studied in different fractions of wheat grains. Ethylene oxide in a concentration of 85 mg/kg was used for the fumigation of whole wheat grains with water contents ranging from 9.3 to 15% for 18 hours. The grains were then stored airtight for 3 months at which time they were milled and separated into 10 different fractions for study of the distribution of radioactivity. Of the total bound

ethylene oxide, 85% had been converted into water-soluble compounds. The total ethylene oxide and metabolite residue ranged from 14 to 37.5 ppm. Judging from the distribution of the radioactivities in the different fractions, 17.23 to 21.83% of the total ethylene oxide were found in water-soluble proteins, 3.71-28.30% in amino acids, 13.49-32.98% in mono- and oligosaccharides, 25.48-28.82% in other water-soluble constituents, 0.18-0.35% in lipids, 0.21-0.43% in lipoproteins, 2.61-3.78% in water-insoluble proteins (gluten), 5.86-11.35% in starch, and 1.68-2.87% in bran.

75-0724. Franz, J. M. (Inst. Biol. Schaedlingsbekaempfung, Biol. Bundesanst. Land- Forstwirtsch., Darmstadt, Germany). **Die Pruefung von Nebenwirkungen der Pflanzenschutzmittel auf Nutzarthropoden im Laboratorium—ein Sammelbericht. [Testing of side effects of pesticides on beneficial arthropods in the laboratory—a review.]** *Z. Pflanzenkr. Pflanzensch. 81(2/3): 141-174; 1974.* (88 references) (German)

Methods developed for laboratory study of the side effects of pesticides on beneficial arthropods are reviewed with particular regard to the problems encountered in such studies. Problems involved in the specific formulation and application, the application and determination of the dose, the direct and indirect effects of pesticides on arthropods, initial effect and persistence (measured as half-effect time), choice of test arthropods, and methods of measuring the effects are discussed. The LD50 can usually be determined after topical application of the pesticide. Reduction of performance of the test organisms is more sensitive than measurement of mortality alone and is better suited for such experiments. Different methods should be adopted for the study of side effects in parasitoids and predators.

75-0725. Dierickx, P. J.; Vendrig, J. C. (Lab. Plantenfysiol., Louvain, Belgium). **Metabolism of the synthetic growth regulator α-chloro-β-(3-chloro-*o*-tolyl)-propionitrile by mung bean seedlings.** *Z. Pflanzenphysiol. 23(4): 11-22; 1974.* (17 references)

The uptake and metabolism of the synthetic auxin α-chloro-β-(3-chloro-*o*-tolyl)propionitrile (Cl-CITPN) by mung bean seedlings and hypocotyl segments was studied. Cl-CITPN was taken up much faster by the hypocotyl segments than by the roots of intact plants. In extracts of plants treated with Cl-CITPN, several metabolites were detected by chromatography: α-chloro-β-(3-chloro-*o*-tolyl)propionic acid; α-hydroxy-β-(3-chloro-*o*-tolyl)propionitrile; and α-(3-chloro-*o*-tolyl)acetic acid (CITAA). A number of other unidentified metabolites, most of them nonpolar, were also found. From the identified metabolites and from the growth promoting activity of several homologues in the Avena cylinder test, it appears that Cl-CITPN is converted to CITAA, which is presumably the physiologically active form of Cl-CITPN.

75-0726. Kagan, Yu. S. (Author address not given). **Osnovnyye napravleniya issledovaniy po toksikologii pestitsidov i profilaktike ikh vrednogo vliyaniya. [Basic trends in the study of pesticide toxicology and prophylaxis of their harmful effects.]** *Zh. Vses. Khim. Obshchest. 19(2): 192-200; 1974.* (122 references) (Russian)

Studies on the harmful effects of pesticides are reviewed, and general problems of preventing such effects are discussed. Accumulation of DDT in fatty tissues in different populations all over the world was established. DDT, DDE, lindane, dieldrin, aldrin, and heptachlor epoxide were detected in human milk. Increased susceptibility to pituitrin and similar compounds and accelerated development of cholesterol-induced atherosclerosis following prolonged administration of DDT were observed in experimental animals. DDT was found to have gonadotoxic, mutagenic, and carcinogenic action. Parathion, methyl parathion, dichlorvos, and diazinon were found to pass through the placental barrier and to exert an embryotoxic effect. The embryotoxic effect is due to the phthalimide fraction rather than to the organophosphorus molecule proper. Trichlorfon and methylmercaptophos were recently found to be gonadotoxic, embryotoxic, and teratogenic. Carbaryl, a promising alternative for DDT, was found to be highly gonadotoxic, while ziram, zineb, and especially maneb are embryotoxic. Dithiocarbamates were found to have slight blastomogenic action in experimental animals. Zineb, maneb, ziram, and thiram significantly increase the frequency of chromosomal aberrations.

See also 75-0592 75-0609 75-0714

75-0727. Bagness, J. E.; Sharples, W. G. (ICI Plant Protection LTD., Yalding, Kent, England). **Determination of the substituted pyrimidine pesticides ethirimol, dimethirimol, pirimiphos-methyl, pirimiphos-ethyl and pirimicarb in technical and formulated materials by gas chromatography.** *Analyst (London) 99(1177): 225-232; 1974.* (5 references)

Gas chromatography has been used to determine the members of a group of substituted pyrimidines comprising 2 systemic fungicides, ethirimol and dimethirimol; 2 insecticides, pirimiphos-methyl and pirimiphos-ethyl; and an aphicide, pirimicarb. Ethirimol and dimethirimol are hydroxy compounds which were determined by gas chromatography with flame-ionization detection after conversion to their volatile trimethylsilyl ethers. The other compounds were determined directly without derivative formation. All separations were carried out on a column packed with 100 to 120-mesh Celite coated with 10% silicone elastomer. Depending on the retention time of the compound to be determined, either *n*-octadecane or *n*-nonadecane was added as an internal standard. The procedures are applicable to the technical pesticides and to a range of formulated products. The methods are sufficiently specific and accurate to be recommended for referee purposes, and their precision is satisfactory for routine control.

75-0728. Thompson, R. H.; Fishwick, F. B.; Green, M.; Grevenstuk, W. B. F.; Harris, A. H.; Hart, H. V.; Heuser, S. G.; Hoodless, R. A.; Scudamore, K. A.; Speek, A. J.; Smart, N. A. (Ministry of Agr., Fish., and Food, Hatching Green, Harpenden, Hertfordshire, England). **The determination of residues of volatile fumigants in grain.** *Analyst (London) 99(1182): 570-576, 1974.* (5 references)

The Panel on Fumigant Residues in Grain was established in 1973 by the Committee for Analytical Methods for Residues of Pesticides and Veterinary Products in Foodstuffs. Its purpose was to study gas-liquid chromatographic methods for determining volatile fumigant residues in grains, keeping in mind its possible application to other fumigated foodstuffs. In the Heuser-Scudamore method the intact grains are extracted with aqueous acetone at room temperature, without grinding, for gas-liquid chromatography; this method was established by the panel to be suitable for the determination of carbon tetrachloride, chlorform, trichloroethylene, and 1,2-dibromoethane residues in wheat and maize.

75-0729. Ott, D. E.; Liebig, G. F., Jr. (Dept. Entomol., Univ. California, Riverside, CA 92502). **Concentration of pesticide residue solutions with a modified commercial multi-tube solvent evaporator.** *Bull. Environ. Contam. Toxicol. 12(4): 417-420; 1974.* (3 references)

Among the techniques commonly used for the partial or complete removal of organic solvents during the analysis of pesticide residues are the partial vacuum technique and the multi-air-jet evaporation technique. The Rotary Evapo-Mix, originally designed for use with the former technique, can be adapted for use with the latter. Modification involves the substitution of glass air-jet tubes for the standard glass vacuum-trap heads, and connection of a clean dry-air source to the manifold instead of a source of vacuum as in the original mode. When used in the modified mode, the entire unit is placed in a fume hood. The device in its modified form quickly and efficiently evaporates most of the commonly used solvents in pesticide residue methodologies from almost any tube or vial. Excessive heat should be avoided and suitable "keepers" incorporated when concentrating some pesticide solutions to small volumes. The modified solvent evaporator offers at least two advantages over the standard version: freedom of choice of type and size of vial or tube; and long tubes which can be raised during the concentration step to allow ready observation of small volumes of solution in the bottoms.

75-0730. Vas'kivs'ka, L. F. (Author address not given). **Viznachennya DDA ta kharakter spryamovanosti protsesiv peretvorennya DDT u biosubstratakh. [DDA detection and the nature of regulation of the DDT transformation processes in biosubstrates.]** *Dopov. Akad. Nauk. Ukr. RSR Ser. B 9: 827-829; 1974.* (3 references) (Ukrainian)

Method for the determination of DDA, and studies on the residue dynamics and metabolism of DDT in biosubstrates are described. Following extraction with ether DDA is transferred onto a silica gel layer for chromatographic determination, using 75:15:5 ratio of *n*-hexane, benzene, and glacial acetic acid as a solvent system and silver nitrate as a visualizing agent. The DDT and DDE levels in milk from women not exposed to DDT were found to be in a range of 0.08-0.14 mg/l, and levels of 0.5-1.0 mg/l were found in milk samples from females exposed to DDT. In subjects not exposed to DDT, DDE concentrations of 0.02 mg/l were detected in urine samples. The urinary DDT, DDE, and DDD (TDE) levels in agricultural workers engaged in the distribution of DDT were between 0.5 and 8 mg/l. Rats fed a single LD50 dose of DDT excreted DDT and DDE 2 hr after poisoning, DDT, DDE, and traces of DDA after six hr, and a urinary DDA level of 0.1 mg/l was measured after 2 days. The findings indicate that DDT is eliminated from the organism in the form of DDT and DDE in milk; in the form of DDT, DDE, and DDD in feces; and as DDT, DDE, and DDA in urine.

75-0731. Que Hee, S. S.; Sutherland, R. G.*; Vetter, M. (Dept. Chem. and Chem. Eng., Univ. Saskatchewan, Saskatoon, Saskatchewan, Canada S7N OWO). **GLC analysis of 2,4-D concentrations in air samples from central Saskatchewan in 1972.** *Environ. Sci. Technol. 9(1): 62-66; 1975.* (7 references)

Levels of 2,4-D [(2,4-dichlorphenoxy)acetic acid] in the atmosphere of central Saskatchewan were estimated as butyl and octyl esters using a two-column gas liquid chromatography technique, and then further characterized by chemical derivatization. GLC mass spectrometry confirmed the presence of 2,4-D. Mean total daily levels of 2,4-D (as *n*-butyl ester) found for Saskatoon for 33 days were 600 ng/m^3 of air, and for Naicam for 47 days, 142 ng/m^3 of air. Very little 2,4-D was detected at Rosetown. (Author abstract reprinted by permission of the American Chemical Society)

75-0732. Thielemann, H. (DDR-36 Halberstadt, Wasserturmstrasse 10, DDR). **Nachweisgrenzen herbicidwirksamer Substanzen mit unterschiedlichen Spruehreagentien an Fertigfolien fuer die Duennschicht-Chromatographie. [Detection limits of herbicides with different spray reagents on ready-made foils for thin-layer chromatography.]** *Fresenius' Z. Anal. Chem. 272(4): 286; 1974.* (3 references) (German)

The detection limits of 2,4-D, 2,4-DP (dichlorprop), MCPB, MCPP, and MCPA with different spray reagents on ready-made silicagel foils were studied. An 80:20 mixture of benzene with acetone was used for the thin-layer chromatographic detection. The detection limits were determined to be 0.8 μg for 2,4-D-propionic acid, MCPA, and 2,4-D-butyric acid; 1.0 μg for MCPB and MCPP; and 0.6 μg for 2,4-D acid when 0.02% solution of rhodamine B in ethanol was used as a spray reagent with subsequent UV irradiation. When 0.04 g bromocresol green in 100 ml ethanol with 0.1 *N* sodium hydroxide was used for spraying, the detection limits were 10 μg for all herbicides except for 2,4-D butyric acid that was detectable from 2.0 μg. A detection limit of 0.8 μg for 2,4-D butyric acid and 1.0 μg for all other herbicides was determined with a spray reagent composed of 0.075 g bromocresol green and 0.025 g sodium carbonate in water. The lower limits of semiquantitative determination were about 5 to 12 times as high as the respective detection limits.

75-0733. Lawrence, J. F. (Food Nutr. Div., Food Res. Lab., Health Protect. Branch, Tunney's Pasture, Ottawa, Ontario, K1A OL2, Canada). **Confirmation techniques for triazine herbicides by gas chromatography with electrolytic conductivity detection.** *J. Agr. Food Chem. 22(6): 936-938; 1974.* (13 references)

Three chemical derivatization techniques for triazine herbicides were examined for the confirmation of these compounds in plant materials. Methoxylation of chloro-*s*-triazines carried out in sodium methoxide–methanol quantitatively yielded the corresponding methoxy analogs. Thus, atrazine, simazine, and propazine were converted to atratone, simetone, and prometone, respectively. The methylation of triazines containing secondary amino substituents was readily accomplished with methyl iodide–sodium hydride in dimethyl sulfoxide. The methylated products were easily separated from their parents on a 5% Reoplex 400 column. The hydrolysis of the ring amino substituents from a number of triazines for subsequent coupling with 2,4-dinitro-1-fluorobenzene offered a third approach to triazine herbicide confirmation. The resulting dinitrophenylamines were then used to identify the parent triazine. These derivatization reactions were applied to residue analysis at concentrations of less than 0.05 ppm. (Author abstract reprinted by permission of the American Chemical Society)

75-0734. Hall, S.; Reichardt, P. B. (Univ. Alaska, Fairbanks, AK 99701). **DDE levels in birds. An environmentally oriented undergraduate experiment.** *J. Chem. Educ. 51(10): 684; 1974.*

A procedure suitable for a junior level environmental chemistry course in college has been devised which enables detection of DDT derivatives to a 1 ppm level in birds. A tissue sample is ground with an equal weight of anhydrous sodium sulfate. The resulting powder is quantitatively transferred to a Soxhlet extractor and extracted with a 2:1 mixture of hexane-acetone. The lipid extract is concentrated and oven dried. A chromatographic adsorbent of 10 g Celite, 3 ml fuming sulfuric acid, and 3 ml concentrated sulfuric acid for each g of extracted lipid (maximum 5 g) is prepared. The paste is packed and dried. The column is rinsed with hexane (40 mg/10 g Celite) and drained. The lipid extract in hexane is applied to the column. Detection is accomplished using a gas chromatograph equipped with a flame ionization detector. Although traces of lipid which survive the cleanup procedure do appear in the gas chromatography trace, they present no real difficulty. In local birds tested, DDT derivatives were found in the range of 0-10 ppm.

75-0735. Glover, I. T.; Minter, A. P. (Oak Ridge Associated Univ., Oak Ridge, TN 37830). **Analysis of chlorinated hydrocarbon pesticides. Experiments for nonscience majors.** *J. Chem. Educ. 51(10): 685-686; 1974.*

Experiments are easily devised which demonstrate the analytical techniques of thin-layer chromatography, ultraviolet spectrophotometry, and gas-liquid chromatography as well as take advantage of the current interest in environmental effects of hydrocarbon pesticides. TLC separation of DDT, DDE, and DCBP is achieved with hexane solvent. The components of the chromatogram may be visualized in iodine vapor or by UV illumination. Ultraviolet spectrophotometry allows quantitative analysis of DDT and DDE by scraping the resolved spots of these pesticides and an internal standard from the TLC plate, leaching each component into 95% ethanol, and measuring the UV absorbance relative to the internal standard. The main analytical tool in use today for pesticide residue determination is gas-liquid chromato-

graphy. Chlorinated hydrocarbon pesticides may be separated by a variety of stationary phases; the one used in this study is an SE-30 column at 225°C with He carrier gas at a flow rate of 62.5 ml/min and a flame ionization detector. Retention times for DDT, DDE, and DCBP are 6.2, 3.8, and 2.1 min, respectively. Results indicate that TLC analysis should be reserved for nonscience majors, UV spectrophotometry be developed for an ambitious student or group of students rather than as a lab exercise, and that emphasis be placed on GLC analysis for use in labs for general chemistry, analytical chemistry, or instrumental analysis as well as in courses for nonscience majors.

75-0736. Hall, R. C. (Dept. Entomol., Purdue Univ., West Lafayette, IN 47907). **A highly sensitive and selective microelectrolytic conductivity detector for gas chromatography.** *J. Chromatogr. Sci. 12(3): 152-160; 1974.*

The construction and operation of a microelectrolytic conductivity detector are described. The detector features a novel unitized gas-liquid separator-conductivity cell that is self-starting and maintaining. The detector is about the same size as other detectors such as the flame ionization or electron capture units, and has none of the limitations of the commercially available Coulson electrolytic conductivity detector. The need to vent the solvent peak to prevent carbon deposition in the quartz reaction tube was circumvented by using a small bore (0.5-1.0 mm) tube. The large response to carbon dioxide (product from hydrocarbons in the oxidative mode) encountered with other conductivity detectors was virtually eliminated by employing a nonaqueous conductivity solvent. The detector can be used for the selective detection of halogen, sulfur, and nitrogen containing compounds. Minimum detectability of common chlorinated hydrocarbon pesticides such as aldrin, dieldrin, heptachlor, etc., is 10-20 picograms. Selectivity relative to carbon is about 10^4 and linearity is greater than 10^5.

75-0737. Willmott, F. W.; Dolphin, R. J. (Mullard Res. Labs., Redhill, Surrey, England). **A novel combination of liquid chromatography and electron capture detection in the analysis of pesticides.** *J. Chromatogr. Sci. 12(11): 695-700; 1974.* (20 references)

A combination of liquid chromatography and electron capture detector has been developed in which the connection between the column and the detector avoids the use of a complex phase transport system and does not introduce any significant loss in column resolution. A direct comparison was made between a variable wavelength UV absorption detector and the electron capture detector with particular reference to analysis of organochlorine pesticides and the polychlorinated biphenyl, Aroclor 1260. Operation of the electron capture detector in both the conventional pulse mode and the newer constant current mode showed that its sensitivity to organochlorine pesticides is about 2 orders greater than that of UV absorption detectors, enabling less than 10^{-10}g of aldrin to be detected. The linear working range in the constant current mode is about 500, but appreciably less than this in the pulse mode.

75-0738. Ososkova, T. A.; Rozhkova, N.,K. (Inst. Chem. Plant Materials, Acad. Sci. Uzbek SSR, USSR). **Opredeleniye butilkaptaksa v semenakh khlopchatnika i pochve metodom tonkosloynoy khromatografii. [Determination of butylcaptax in cotton seeds and in soil by thin-layer chromatographic method.]** *Khim. Sel. Khoz. 9: 58-59; 1974.* (Russian)

A thin-layer chromatographic method for the quantitative determination of butylcaptax in cotton seeds and in soil samples is described. Following repeated extraction with ethanol from cotton seeds, and with *n*-hexane from soil, the sample is reextracted with *n*-hexane, dried with anhydrous sodium sulfate, and evaporated. The *n*-hexane extract is transferred onto an alumina layer, using 1:1 ratio of *n*-hexane with benzene as a solvent system, and bromophenol blue in acetone and silver nitrate as a visualizing agent. The sensitivity of the thin-layer chromatographic method is 1 mg/kg in cotton seed and 0.8-1 mg/kg in soil.

75-0739. Safe, S.; Hutzinger, O. (Nat. Res. Council of Canada, 1411 Oxford St., Halifax, Nova Scotia, Canada). **Mass spectrometry of pesticides and pollutants.** *CRC Press, Cleveland, 1973, 220 p.* (588 references)

All the information published to date on mass spectrometry of pesticides and pollutants is collected and discussed. An introduction to mass spectrometry contains 107 references. Other ionization processes discussed with their application to pesticides are negative ion mass spectra, chemical and field ionization, and field desorption. Mass spectrometry in combination with GC or TLC, and derivatization and analysis of mixtures are discussed. The major portion of the book deals with specific compounds arranged according to chemical function. Their mass spectra and fragmentation patterns are presented and discussed in some detail. The compounds include polychlorinated biphenyls, naphthalenes, terphenyls, dibenzodioxins and dibenzofurans, polycyclic aromatic hydrocarbons, phthalates, chlorinated benzene isomers, chlorinated aromatic pesticides including the chlorophenoxy acids and related compounds, chlorinated phenols, chlorodiphenyl methanes, bridged polycyclic chlorinated hydrocarbons, isomeric hexachlorocyclohexanes, carbamates, ureas, anilides, chloroanilines, triazines, uracils, organomercury, organotin and organophosphorus compounds, and other pesticides and related compounds.

75-0740. Valange, B.; Henriet, J. (Laboratorie de Chimie, Station de Phytopharmacie de l'etat de

Gembloux, Belgium). **Caracteristiques chimiques et physico-chimiques des formulations a base de prophame et de chlorprophame. [Chemical and physicochemical characteristics of IPC and CIPC base formulas].** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 929-940; 1973.* (10 references) (French)

Methods of determining IPC (propham) and CIPC (chlorpropham) content are discussed in connection with the testing of 14 commercial dusting powders used to inhibit sprouting of tubers during storage. Detection of the aniline radical by titration with sodium nitrate was used to determine total IPC and CIPC. Gas chromatography over 3% OV 17 was used to separately determine the 2 active principles. Also determined were the physicochemical properties of grain size, pH, and thermostability (grain size redetermined after 14 days' storage at 54°C). All determinations satisfied FAO standards (± 15% tolerance) and manufacturers' guarantees. Slight agglomeration after heat storage test could be explained by the low melting point of CIPC (41.4°).

75-0741. Bertram, U.; Gersteuer, T.; Ohnesorge, F. H.; Scheufler, E. (Dept. Toxikol., Inst. Pharmakol., Univ. Kiel, Kiel, Germany). **Properties of carrier-bound cholinesterases (E.C. 3.1.1.7. and 3.1.1.8).** *Naunyn-Schmiedeberg's Arch Pharmakol. 282(Suppl.): R9; 1974.*

The detection of low concentrations of highly reactive organophosphates (OP) by means of cholinesterase (ChE) inhibition raises some problems, since the available ChE preparations are unstable and water-soluble. Both difficulties can be overcome by the coupling of specific (AChE) or nonspecific ChE to a copolymer of butanediol vinylether and maleic anhydride. This process can be easily performed and yields a product of high activity. Seven per cent of the total protein was found to be bound to the carrier. The enzymatic activity of the carrier-coupled AChE amounted to 60% of that of the free enzyme. Different batches of the coupled AChE show identical properties (pH-opt. 8.5; substrate-opt. 3×10^{-3} *M*ACh; *Km* 1.9×10^{-4} *M*ACh), which do not differ from the uncoupled enzyme. The coupled AChE is, however, much more stable with respect to changes of the pH, the ionic strength, the temperature, and can be stored in saline for more than 20 weeks without loss of activity. At 10 and 20°C the bimolecular rate constants of some organophosphorus inhibitors were determined. The knowledge of these constants enables the estimation of the concentration of OP by the determination of the inhibition of the coupled AChE. They can be expressed as paraoxon-equivalents. Certain OPs can be differentiated by the use of coupled AChE or ChE. (Author abstract by permission)

75-0742. Bazzi, B.; Abbruzzese, L.; Galluzzi, G.; Nesti, V. (Cent. Richerche Antiparassitari, Montedison S.p.A., Milan, Italy). **The gas-liquid chromatographic determination of prothoate and the corresponding phosphorothioate residues in fruit.** *Pestic. Sci. 5(5): 511-515; 1974.* (5 references)

The fruit was macerated in acetone and the extract cleaned up by liquid-liquid partition. Prothoate and its phosphorothioate were determined by gas-liquid chromatography with thermionic detection. Recoveries were 75–100% at 0.05 mg/kg for apples, grapes, peaches and oranges and did not critically depend on the stage of ripeness of the fruit. (Author abstract by permission)

75-0743. Akerblom, M. (Agr. Coll. Sweden, Dept. Chem., Div. I, S-750 07 Uppsala 7, Sweden). **Determination of diquat residues in rape seeds.** *Pestic. Sci. 5(5): 517-526; 1974.* (9 references)

A method for the determination of diquat residues in rape seeds has been developed. It is based on the original procedure of Calderbank, Morgan and Yuen as modified by Kirsten for diquat residues in potato tubers, which includes acid hydrolysis, ion exchange clean-up, color formation, and spectrophotometry. When applied to rape seeds the background was too high. Ion pair extraction with bromthymol blue in dichloromethane removed most interfering substances. Measurement of absorbance at three wavelengths 10 nm apart increased the specificity further. Because of varying recoveries from rape seeds (range 35-60%) in the procedure isotope dilution analysis was applied to each sample. The limit of detectability at 40-50% recovery in a 20 g sample is 0.07 mg/kg and in a 50 g sample 0.03 mg/kg. The application to field trials is illustrated. (Author abstract by permission)

75-0744. Hoodless, R. A.; Jackson, F. J.; Tarrant, K. R.; Griffiths, B. E. (Dept. Industry, Lab. of the Government Chemist, Cornwall House, London SE1 9NQ, England). **A radiochemical and gas-chromatographic study of the determination of dichlorvos residues in stored grain.** *Pestic. Sci. 5(5): 555-559; 1974.* (6 references)

An investigation into the extraction of dichlorvos from stored grain and satisfactory storage conditions for samples received for analysis has been carried out using [^{32}P]-dichlorvos. It has been shown that samples can be effectively stored at -17°C and that methanol can be used for the extractable dichlorvos but does not remove the organophosphorus residue bound to the grain. (Author abstract by permission)

75-0745. Nose, N.; Kobayashi, S. (Saitama Inst. Public Health, Saitama, Japan). **[Examination of the activity of Florisil.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 13(4): 272-275; 1972.* (6 references) (Japanese)

Column chromatography using the Rf value of Sudan I was used to analyze Florisil activity. The column was prepared as follows. A glass column (6 ×

200 mm), stopped with cotton at one end, was packed with anhydrous sodium sulfate (to 10 mm), silica gel mixed with Sudan I (5 mm), and the Florisil column to be standardized (160 mm). Chromatography was performed by the ascending method using a 3:7 mixture of ethanol and *n*-hexane. Florisil activity was determined by the Rf value of the dye. This method for determining Florisil activity is useful in cleaning samples to be used in analysis of organochlorine insecticides.

75-0746. Kiseleva, N. I. (Lab. Anal. Chem. Pesticides, All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastic Materials, Kiev, USSR). **Khromatograficheskiye metody opredeleniya polikhlorpinena i polikhlorkamfena v moloke. [Chromatographic method of determining toxaphene and strobane in milk.]** *Vop. Pitan. 4: 74-77; 1974.* (12 references) (Russian)

Chromatographic methods for the cleanup and determination of polychlorocamphene (toxaphene) and polychloropinene (strobane) residues in milk are described. The residue is extracted by means of *n*-hexane or petroleum ether, after which the sample is cleaned up by concentrated sulfuric acid or by a column chromatographic method, using silica gel as adsorbent and *n*-hexane as eluent. In the presence of DDT and other organochlorine pesticides, strobane and toxaphene are determined by micro-thin-layer chromatography, using silicagel particles of 3-10 microns in size, and a 10:4:0.3 mixture of *n*-hexane, methanol, and ammonia as solvent system. The sensitivity of this method is 0.2-0.3 μg. When no DDT is present the determination is possible by a macro-thin-layer chromatographic method, using 100 mesh silica gel and a 5:1 ratio of *n*-hexane with ethyl acetate as the solvent system. Visualization is done either by silver nitrate and ammonia solution in acetone in UV light, or by means of diphenylamine solution and zinc chloride in acetone. The sensitivity of this method is 3.5μg or 0.006-0.1 mg/liter. Another gas-liquid chromatographic method using a Pu239 radioactive source and nitrogen as carrier gas has a sensitivity of 0.005-0.01 μg or 0.02 mg/liter.

75-0747. Iwaida, M.; Kaneda, Y.; Yamaji, A. (Osaka Branch, National Institute of Hygienic Sciences, Osaka, Japan). **[Analytical studies of pesticides by gas chromatograph with flame photometric detector, part 3. Determination of organophosphorus insecticides in sulfur-containing samples.]** *Yakugaku Zasshi (J. Pharm. Soc. Jap.) 94(9): 1178-1180; 1974.* (7 references) (Japanese)

Sulfur-containing substances in vegetables such as Japanese leek, onion, scallion, and garlic often interfere in the analysis of organophosphorus insecticide residues in the vegetables by gas chromatography with FPD. It was found that clean-up by Florisil column chromatography and selection of optimum flame condition for phosphorus mode FPD with least cross-interference from sulfur mode were necessary to eliminate such interference. Six kinds of organophosphorus insecticides, diazinon, ronnel, fenthion, malathion, fenitrothion, and parathion, fortified in four kinds of sulfur-containing vegetables, Welsh onion, onion, leek, and garlic, were analyzed after extraction with benzene by the present method. The recoveries were very good, 100-107%, except those in garlic and except in the case of fenthion. The insecticide residues were satisfactorily analyzed by gas chromatography with FPD using TLC following the Florisil-clean up. The detection limit of this method was 0.5 ppm.

75-0748. Iwaida, M.; Yamaji, A.; Kaneda, Y. (Osaka Branch, National Institute of Hygienic Sciences, Osaka, Japan). **[Analytical studies on pesticides by a gas chromatograph with flame photometric detector, part 4. Analytical method for captan, captafol, and oxythioquinox residues.]** *Yakugaku Zasshi (J. Pharm. Soc. Jap.) 94(10): 1334-1337; 1974.* (7 references) (Japanese)

Analytical methods for residual amounts of captan, captafol (Difolatan), and oxythioquinox (Morestan) were investigated by gas chromatography with FPD. A column with 5% DC-200 gave a good separation of these pesticides from nine organophosphorus pesticides, parathion, diazinon, ronnel, fenitrothion, methyl parathion, malathion, fenthion, ethion, and phorate. The relative response ratios of these pesticides to parathion (peak height response of phosphorus channel divided by square root of the peak height response of sulfur channel) were determined, and they were found useful for identifying these agricultural pesticides. Residues of these pesticides (added to orange, pumpkin, cucumber, strawberry, grape, pear, eggplant, pimiento, and tomato) were extracted with benzene. The extract was concentrated, cleaned up on a Florisil column chromatograph, and analyzed by FPD in the S mode. The recoveries of the fortified pesticides ranged from 81% for oxythioquinox on strawberry and tomato to 115% for captan on pimiento.

75-0749. Gottschall, S.; Tiess, D. (Abteilung fuer Toxikologische Chemie, Inst. gerichtliche Med., Rostock Univ., Rostock, DDR). **Moeglichkeiten der toxikologisch-analytischen Schnelldiagnose nach Einnahme von Haushaltschemikalien. [Possibilities of toxicologic analytical rapid diagnosis after ingestion of household chemicals.]** *Z. Aerztl. Fortbild. 68(2): 62-69; 1974.* (32 references) (German)

Possibilities of the rapid analysis of toxic substances in acute poisonings by household chemicals are described. Model studies by the use of proven toxicological analytical methods were performed on some 100 different household chemicals, including acaricides, fungicides, rodenticides, insecticides, and herbicides containing such compounds as coumarin derivatives, aromatic nitro compounds, halogenated hydrocarbons,

copper, zinc and mercury salts, lead compounds, and 2,4-D esters. Simplified extraction method, standardized UV spectrometry, and standardized thin-layer chromatographic methods, and combinations of the latter two methods were applied. The model media used were water, formaldehyde, sulfuric acid, artificial gastric juice, and methanol.

75-0750. Seifert, J.; Davidek, J. (Dept. Food Chem. Anal., Inst. Chem. Technol., Prague, Czechoslovakia). **Indirect polarographic determination of trichlorfon and dichlorvos.** *Z. Lebensm.-Unters.-Forsch. 155(5): 266-270; 1974.* (15 references)

Indirect polarography was used in the determination of trichlorfon and dichlorvos. Glyoxal, the product of alkaline hydrolysis of both these organophosphorus insecticides, condenses with *o*-phenylenediamine to form quinoxaline which is polarographically reduced yielding a well-developed two-electron wave. The relation of the concentration of the insecticides and corresponsing diffusion current is rectilinear in the broad concentration range of 0-8 mg. Standard deviation for this method is ±1.2% for 400 μg and ± 5.2% for 3.0 μg of trichlorfon, respectively. Anaerobic conditions must be maintained during condensation as the presence of oxygen can cause formation of *o*-phenylenediamine derivatives which disrupt the accuracy of the polarographic determination. This method is useful in determining dichlorvos and trichlorfon in samples containing varying amounts of impurities and for dichlorvos determination in commercial sheets impregnated with this insecticide.

75-0751. Weil, L.; Quentin, K. E. (Inst. Wasserchem. Chem. Balneol., Technische Universitaet, Munich, Germany). **Zur Analytik der Pestizide im Wasser. VIII. Mitteilung: Bestimmung von insektiziden chlorierten Kohlenwasserstoffen. [Analysis of pesticides in water. Part 8. Determination of insecticidal chlorinated hydrocarbons.]** *Z. Wasser Abwasser-Forsch. 7(5): 147-152; 1974.* (11 references) (German)

The general procedure of sampling, extraction, clean-up, and qualitative and quantitative determination of organochlorine pesticide residues in water is described. Glass or aluminum vessels should be used for sampling; plastic materials cause losses due to adsorption, and possibly interference in the determination. Direct extraction with *n*-hexane is used most often. Clean-up is done on silica gel columns using a 99:1 mixture of heptane with acetone as an eluent. The determination of organochlorine pesticides in the concentrations usually occurring in water requires the use of a gas chromatograph with linear electron capture detector. Identification is possible by comparison of the retention times on several stationary phases, or by a combination of gas chromatography with mass spectrometry. Quantitative determination is done by comparison of the peak heights.

75-0752. Budnikov, G. K.; Toropova, V. F.; Ulakhovich, N. A.; Viter, I. P. (V. I. Ul'yanov-Lenin Kazan State Univ., Kazan, USSR). **Elektrokhimicheskoye povedeniye ditiokarbaminatov na rtutnom elektrode. Soobshcheniye 3. Polyarograficheskoye issledovaniye fungitsidov tipa ditiokarbaminatov v organicheskihk rastvoritelyakh. [Electrochemical behavior of dithiocarbamates at the mercury electrode. Communication 3. Polarographic study of fungicides of the dithiocarbamate type in organic solvents.]** *Zh. Anal. Khim. 29(6): 1204-1209; 1974.* (19 references) (Russian)

The polarographic behavior of ferric, manganese, and zinc dimethyldithiocarbamates (ferbam, ziram, and marbam), as well as zinc and manganese ethylene-bis-dithiocarbamates (zineb and maneb) at the mercury electrode was examined in various organic solvents, such as benzene, *m*-xylene, toluene, ethyl acetate, butyl acetate, and chloroform by classical, alternating current, and oscillographic polarography. Methanol was used as ionizing solvent. The ratio of extracting solvent to ionizing solvent was 2:3. Both zinc and manganese ethylene-bis-dithiocarbamates were dissolved in dimethylformamide. The polarographic wave heights were found to decrease with increasing solvating capacity of the solvent. The highest sensitivity was obtained for benzene extracts of the fungicides. The sensitivity of determining ferric and manganic dimethyldithiocarbamates from the first reversible wave can be increased to 10^{-7} mol/liter by using AC polarography.

See also **75-0527** **75-0528** **75-0566**

PESTICIDES ABSTRACTS

QUARTERLY INDEX

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PREFACE

The basic design for this index was supplied by the Technical Services Division, Office of Pesticide Programs, Environmental Protection Agency. It consists of two subject indexes (concept and compound) and two author indexes (personal and corporate). Primary and secondary headings in the Concept Index appear as subordinate headings in the Compound Index, both indexes having three levels of specificity.

In the Concept Index, only general aspects are indexed under the broader terms shown below. For specific terms, the reader should consult the appropriate heading in the Concept Index, selecting the narrower term that best fits his need.

Compounds are indexed by their common names; where other compound designations are used by authors, these synonyms appear with the notation to *see* the common name. Articles referring, in general, to structural or functional chemical classes are indexed under the broader headings (e.g., organochlorines, herbicides, etc.).

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